THE MARINE REVIEW

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NEW DOCK SCHEME FOR PLYMOUTH.

Notice of a huge dock scheme for Plymouth has been given to the British parliament recently and the project is being received with great interest in the west of England.

Wembury Bay, where it is proposed to provide for the accommodation of the largest liners afloat or contemplated, is the sea area to the east of Plymouth outside the Mewston. At present there is no quay or wharf for vessels of the biggest class, although there are several docks of moderate size.

The scheme provides for enclosing a large area, perhaps 1,000 acres, of Wembury Bay by the construction of three sea walls, in which the largest dock in the United Kingdom is to be constructed, with a depth of from 48 ft. to 35 ft. at low water and capable of accommodating at its quay and jetties eight to ten of the largest liners.

It is also proposed to reserve space for two graving docks each more than 1,000 ft. in length, as well as for a large and sheltered area in which vessels might be maneuvered with perfect safety when entering or leaving the docks.

It would be necessary to connect the docks with Plymouth by a railway about four miles in length.

AMERICAN BRIDGE IN BURMA.

Cable advices received from Rangoon, Burma, state that the new Scherzer rolling lift bridge across the Ngawan river is completed and opened for railroad traffic. This, the largest bridge constructed in Burma, has a movable span 220 ft. long, the total length of bridge being 820 ft. The bridge is constructed on the main line of the Burma railway's extension connecting Rangoon with Kyngin. The Ngawan river is in the fertile delta of the Irawaddy river and forms a connection between this river and the Bay of Bengal. The government authorities required the large movable span to expedite the railroad traffic and the heavy traffic on the river carried on by the Irawaddy Flotilla Co.'s vessels, which traverse these waterways from the coast to the interior of Burma, as far as Mandalay, more than 400 miles inland. This bridge was designed by The Scherzer Rolling Lift Bridge Co., of Chicago and New York, and manufactured in England at the works of Spencer & Co., Melkeham, Wilts, and erected in Burma under the charge of the engineers of The Scherzer Rolling Lift Bridge Co. Though the difficulties to contend with were very great the bridge was completed within a year. During the rainy season, extending from May to October, the river was subject to great floods. During the dry season several hundred natives died from an epidemic of Asiatic cholera.

VARYING OPINIONS OF TOWS.

Opinion in shipping circles is somewhat divided as regards the recent order of Secretary Straus, of the department of commerce and labor, regulating the towing of barges on inland waters.

Neither ship owners or barge men look upon the new order as at all a settlement of the long controversy over the best method of transportation by water of merchandise in bulk, although it is favored by navigators as reducing the dangers of ocean navigation and by ship builders and ship chandlers as likely to cause a revival of construction of the smaller class of vessels as well as necessitating the provisioning of the same, especially if there shall prove to be a return to sailing craft.

The barge line owners assert that limiting the number of vessels in a tow to three will necessitate additional expense in building larger barges, which, being unable to enter the small bays and streams, will mean a rise in the price of fuel to the consumer. The bargemen also look upon that part of the order decreasing the length of the tow line to 75 fathoms between barges as dangerous, especially in heavy weather.

On the other hand, the shipping interests are strong in the opinion that the order is not sufficiently radical, as it fails to deal with the long distance towing from the Chesapeake and Delaware Capes to northern waters. Sailing masters complain that there was nothing to prevent a tug leaving Newport News with six barges lashed together in two divisions of three each and after getting outside the capes of the Chesapeake to string them into a tow two miles long.

MR. SATTERLEE ACCEPTS.

Mr. Herbert L. Satterlee, of New York, has accepted the post of assistant secretary of the navy to succeed Truman H. Newberry, who has become head of that department.

Mr. Satterlee, who is a son-in-law of J. Pierpont Morgan, is not altogether unacquainted with navy department affairs, having been a personal friend of Secretary Newberry for many years and also having been attached to the Intelligence Department of the navy during the Spanish war.

The retiring secretary, Mr. Victor H. Metcalf, has returned to his home in California.

The schooner Stanley M. Seaman was launched from the ship yard of Cobb, Butler & Co., Rockland, Me., on Tuesday last.

THE GROWTH OF GLASGOW.

The West of Scotland Iron and Steel Institute made a great success of its annual dinner on Saturday, Nov. 28. Over 300 guests assembled in the Grosvenor restaurant and the company was thoroughly representative of the important industries of the Clyde and surrounding districts. P. N. Cunningham, president of the Institute, was in the chair and he was supported by the Marquis of Graham, Sir John Ure Primrose, T. Worthington (director commercial intelligence department of the board of trade), Bailey Shaw Maxwell, Rear Admiral J. E. Bearcroft, C. B., and representatives of the chief ship building and engineering firms and scientific and trade associations.

The part played by the ship yards of the Clyde in the naval defense of the country was referred to by Rear Admiral Bearcroft, who responded to the toast of "The Navy." He said it was a subject of congratulation that the larger half of the orders for ships recently projected should have been secured by firms on the Clyde. (Applause.) Eleven ships out of the 21 were to be built there, and there was reason to believe that further orders for line-of-battle ships might be shortly expected. (Applause.) With the increase in size and draught of water of the modern battleship, there were distinct indications that facilities for dry-docking ships within a reasonable time of launching would be more and more taken into consideration in the settlement of the tender for naval construction. There was no doubt that the difficulties of dry-docking ships which had an average draught of 30 to 31 ft. and an average beam of anything from 80 to 84 ft., was a very serious matter with the docks at present available. (Hear-Hear.) And it was a matter that would have to be taken into consideration by the great ship building centers.

Some interesting facts illustrating the commercial progress of Glasgow were given by Mr. Worthington, in proposing the toast of "The City of Glasgow." In the three years, 1895-6-7, their imports averaged 11,400,000, as compared with average of 15,000,000 in the year 1905-6-7. (Applause.) The exports during the same period had risen from an average of 13,800,000 to one of 25,700,000. The last figures, he ought to say, in order to make the comparison more correct, was after deducting the value of the ships sent from the port of Glasgow and sold abroad. Those figures were not taken into account prior to 1899. In 1897 there were built of vessels over 15 tons and exclusive of his majesty's ships and of pontoons, 296 vessels with an aggregate net tonnage of 192,500, whereas last year the corresponding numbers were 431 vessels of 348,500 aggregate net tonnage. (Applause.) In the 10 years from 1897, the production of pig iron in the three counties of Lanark, Stirling, and Ayre, averaged 1,100,00 tons, against 1,400,000 last year.

The toast of "The West of Scotland Iron and Steel Institute," was proposed by Sir John Ure Primrose, who struck what he called the note of romance in the industrial progress of Glasgow and the west of Scotland. Nothing, he said, could be more fascinating than the story of Glasgow's rise and progress, and certainly no industry other than the iron and steel industry had been a more potent factor in imperial progress and in commercial advance. It was an axiom that the ore must come to the coal. That today remained to them an almost unassailable fortress. How long it might remain it was impossible to predict. Unless science evolved other methods, the lifetime of their coal supply would measure the possibilities of their being the paramount manufacturer in the realm in which they were all interested. In foreign countries laws were being enacted for the protection of such interests. In Sweden the government claimed pre-emption of all mineral wealth in 1932, with the avowed object of its redemption from the crude into the marketable commodity within their own realm. Even in Newfoundland they were pursuing that process, and buttressing up the industry with a bountiful system that gave local products a fictitious value in competition with British products. It was at least a subject for calm deliberative thought whether they in Great Britain were justified in the prodigal exportation of coal. This was essentially the iron and steel age. The Clyde without the iron and steel industry could never rank as it did as the supreme ship building center of the empire, and they could only remain in that supreme position if they recognized that their river must have an equipment second to none in the world. They must also recognize that it was only by exact method, by trained science, by the product of their technical schools, and the wider product of their universities, that they could ever hope to worthily preserve the traditions of the past.

The president, whom Sir John had referred to as bearing an honored name in the chronicles of the kings of the iron and steel industries, responded for the Institute. It was founded, he said, 17 years ago. Its history had been one of continual progress and the membership was now 450, and the balance in hand was £560.

UPBUILDING OUR MERCHANT MARINE.

The upbuilding of an American merchant marine, the promotion of trade with South America and the Orient and a total forgetfulness of sectional lines in the promotion of this country's commercial interests were urged by Secretary of Commerce and Labor Straus, Secretary of War Wright; John F. Wallace, of New York, former chief engineer of the Panama canal; Surgeon General Walter Wyman, Gifford Pinchot, chief forester; L. C. Glenn, professor of geology, Vanderbilt University; John A. Fox, of Arkansas; John N. Parker, of New Orleans, and others, at the southern commercial congress. The congress, which is composed of more than 200 delegates representing 24 states, breathed a spirit of trade unity, the slogan being "to bring men together in the language of commerce, which is the language of peace."

Three sessions, presided over by G. Grosvenor Daw, secretary of the Montgomery, Ala., Commercial Club. extended into the night and concluded the opening day of congress.

Secretary Straus, who made the opening address, urged federal encouragement of the American merchant marine, as the surest way to expand and hold American trade with South America and the Orient. He deplored the political insignificance of American commerce with South America, declaring that more than $2,000,000,000 of trade annually, which now goes to European countries, rightfully belongs to the United States and, with an adequate merchant marine, could be captured.

Secretary Wright, who spoke on "The Influence of the Panama Canal on the Industrial Development of the Nation," also urged the building of a merchant marine proportionate to the needs of growing country.

"Our present merchant marine is so insignificant," he declared, "that beside that of great European commercial nations it is not worth mentioning as such. In fact, certain private ship owners in Europe own more ships than the total of American-built ships engaged in foreign trade. The

United States government, because of this lack of merchant marine, suffered the humiliation of having the coal for its fleet on its voyage around the world carried in foreign vessels. This seems argument enough for the establishment of a great American merchant marine. The opening of the Panama canal will either mean that we must build one or we will likely lose our entire foreign trade."

BETTER OCEAN MAIL SERVICE.

Postmaster General Meyer in his annual report, just submitted to congress, makes an earnest plea for better ocean mail service. He says:

"With the exception of our service to Europe, the American ocean mail facilities do not compare favorably with those of the other great nations. In no other branch of our postal service has so little been done in the way of helpful legislation, no provision having been made for improving the conditions since the act of March 3, 1891. Under that act we now have a good service to Jamaica, Cuba, and the Atlantic ports of Mexico in our own ships, subject to our own control; but the longer and more expensive routes are not adequately provided for, and with the exceptions above noted our mails to Central and South America, the West Indies, Australasia, and the Orient, are almost wholly dependent on foreign steamers over which we have no jurisdiction. Last year the department recommended, and the senate by a practically unanimous vote passed, a bill (S. 28) providing for more liberal treatment of American steamers carrying the mails. That bill, which is awaiting the action of the house, provides in substance that the compensation of $4 a mile now allowable to 20-knot trans-Atlantic American mail steamers shall also be allowable to American steamers of not less than 16 knots on routes of 4,000 miles or more to South America, the Philippines, Japan, China, and Australasia. I earnestly recommend its early enactment into law.

"Manifest considerations of public policy forbid that we should continue to depend on the irregular service of steamers built abroad, owned abroad, and operated primarily by and for foreign interests. Now, even more than last year, we are dependent on the auxiliary cruisers and merchant vessels of other nations for the means of reaching the Philippines and the markets of Australasia and the Orient. Within two years the number of American steamers crossing the Pacific and available for carrying the mails has been reduced more than one-half. More liberal compensation to such steamers would appear to be imperative if they are to remain on the seas at all.

"In considering the question of additional cost it should be borne in mind that while the expenses of the department as a whole have exceeded the revenues, our international mail service for many years has produced a large surplus.

"It would require several years to establish the new mail routes contemplated in the bill (S. 28), for most of the fast steamers required would have to be built. The enactment of the bill would, therefore, involve no large expenditure in the immediate future. Incidentally, the creation and development of new ocean mail lines would promote our export trade and our ship building industry and materially strengthen the auxiliary naval forces of our government. I believe the American people expect and desire that their ocean mail service shall be equal to that of other nations, and I urgently recommend that congress aid the department in making it so."

DOCK DEPARTMENT CRITICIZED.

The dock department of the city of New York has recently come in for considerable adverse criticism on the part of shipping interests of that city owing to the obstacles which have been placed in the path of those who may wish to use the public docks. Two piers had been placed in this class by the department after earnest solicitation by the New York Maritime Association. The one in the North River has now been encumbered on one side by a public bath and on the other by an arrangement of bridges for transferring ice, thus reducing the available free pier space to one pier. Commercial organizations are protesting against such embarrassment of those occasional shippers who may have no regular terminals at New York.

RULING ON BOAT KNEES.

The board of general appraisers at New York has overruled the protest of C. D. Bunker & Co., of San Francisco, against the assessment of duty on pieces of wood invoiced as boat knees and described in the protest as ship knees. In deciding against the importer General Appraiser McClelland said: "It is noted that the protest describes the merchandise as '96 ship knees,' and the only evidence in the case is a photograph of the pieces of wood, together with a certificate from the assistant naval constructor of Mare Island navy yard that the said knees were received by the construction and repair department of said navy yard. There is no proof of any kind as to the ultimate use to which the said knees had been applied or were to be applied, and the fair inference from the record is that they were to be used, as the dimensions would indicate, as boat knees. Such use, we do not believe, would bring the pieces of wood in question within the meaning of the term 'ship-timber' or 'ship-planking,' as used in the tariff act."

EFFICIENCY CRUISE.

It is now reasonably certain that the scout cruisers Chester, Birmingham and Salem will be able to start on the long efficiency cruise between Jan. 1 and Jan. 15, as the Chester has now completed all her preliminary trials except the 24-hour run at high speed. The Birmingham and Salem, one ship at a time, with the board of inspection and survey, headed by Rear Admiral McLean, and the engineering board, headed by Capt. F. H. Bailey, with Constructor Ruhn assisting all on board and in charge of the various tests that will be going on at the same time, will probably require a week for each to cover the various water consumption and steam tests. Each vessel is to run the 24-hour high speed trial. Then there are to be three other trials, a 1,000-mile run at 20 knots in company, a 750-mile run at 15 knots, and then a 1,000-mile run at 10 knots. The three will sail together in order to have the same weather conditions for all. There will be no particular formation, but the ships must keep in sight of each other.

The American Bridge Co., Ambridge, Pa., launched the towboat Sarah Edenborn last week. She was built for the Louisiana Railroad & Transportation Co., and is 145 ft. in length. The hull and upper works are of steel and she is probably the first steel-hulled towboat to be built on the scow boat plan.

The ferryboat Brewster, of the Boston Beach & Lynn railroad, was run down by the fishing schooner Georgiana in Boston harbor, Dec. 3, and both vessels were considerably damaged. No one was injured.

The T. S. Marvel Ship Building Co., of Newburgh, N. Y., has been given a contract by the New York Central Railroad Co. for the construction of two steel tugboats for use in towing in New York harbor. They are to be 105 ft. in length.

Modern Ore Handling Machinery.---III.

BY WALTER G. STEPHAN.

A late installation of ore handling machinery designed by Hoover & Mason, of Chicago, is at the new ore and coal dock of the Pennsylvania railroad at Ashtabula harbor, on the southern shore of Lake Erie. The Pennsylvania company's dock is located on the west bank of the Ashtabula river, on a tract of land which was reclaimed for this purpose from an area which was completely under water at the mouth of the river. Some idea of the great extent of this improvement can be obtained from the fact that the reclaimed area is about one-third of a mile long by 750 feet wide, and that over 2,000 feet of new dock was constructed. The new ore handling machinery consists of six Hoover & Mason ore unloaders and one Hoover & Mason ore bridge. In addition to these, a complete new power house and one additional McMyler coal car dumper were installed, the latter being capable of dumping the largest coal cars directly into the hold of a boat.

A good general view of the entire plant is given in Fig. 1, showing the unloaders and ore bridge in their positions relative to the ore yard, which is so arranged that cars can be conveniently supplied to the unloaders or car dumpers as desired with as little handling as possible. The tracks for loaded and empty cars are all made long enough to take an entire train, and the car dumpers are supplied with cars by gravity from a yard which is slightly elevated above the other tracks. From the dumpers the empty cars are carried by a switchback to another storage yard, from which they can be switched either to the main incoming track or to the ore unloaders beyond, or the empty cars can be dropped by gravity directly to the unloaders.

FIG. 1—GENERAL VIEW OF ORE AND COAL HANDLING PLANT OF THE PENNSYLVANIA RAILROAD AT ASHTABULA HARBOR, O.

THE ORE UNLOADERS.

The ore unloaders are carried on front and rear legs, as shown in Fig. 2. The front legs travel on double rail tracks laid on top of the solid concrete face of the dock, which rests upon 12 x 12-inch timber cribbing underneath. The rear legs run on double rail tracks laid on top of a concrete wall which forms the water side of a V-shaped trough extending underneath the cantilevers of the unloaders and the rehandling bridge for a distance of 800 feet. The construction of this trough is interesting and is well illustrated in Fig. 3, which shows it in the process of making. The trough is built between two solid concrete walls about 35 feet center to center at the top, and the depth of the V is 17 feet in round figures, the bottom being rounded to a radius of about 3 feet 6 inches. As a protection from the steel scoops of the bucket, six standard T rails are imbedded in the concrete bottom, as shown in the sectional elevation, Fig. 4, the rails running longitudinally and being spliced with standard splice bars. The trough proper is made of a shell of concrete about 18 inches thick, except at the bottom, where the thickness was increased to 24 inches, and between this

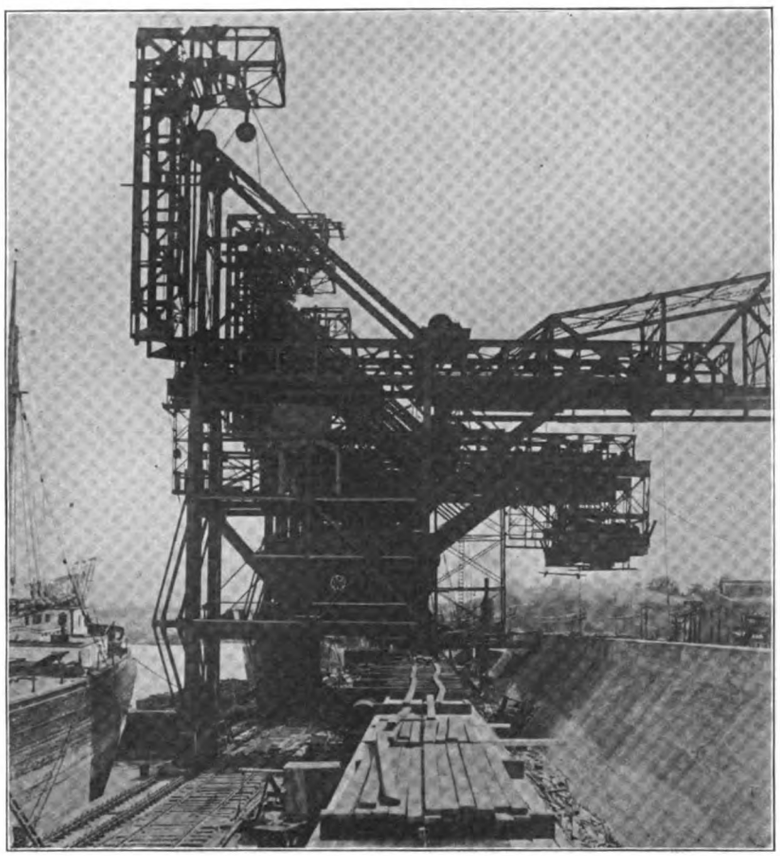

FIG. 2—DETAILS OF CONSTRUCTION OF UNLOADERS, PHOTOGRAPH TAKEN JUNE, 1907.

shell and the two supporting concrete walls is a filling of rock. As completed, this construction looks like a solid concrete trough, whereas it is really made up of considerable rock filling.

The track for the rear leg of the unloaders, which is on top of the trough wall on the water side, is made up of two 85-pound rails 3 feet 6 inches centers, spiked to ties which are laid on top of the concrete wall and drift bolted to it.

The legs of the unloaders are 32 feet center to center and span two standard gage tracks 12-foot centers. The main frame consists of a stiff structural frame work, supporting a double cantilever, the front end of which is hinged so that it can be raised or lowerd to a horizontal position. The peculiarity of this boom is the extension at its extreme outer end, which can be raised out of the way when working in a narrow boat so as not to block the river channel, or which can be lowered to extend the boom in case a particularly wide-beamed boat is being unloaded.

Traveling on a double rail horizontal track supported on the frame work above is a man trolley operating a six-ton Hoover & Mason grab bucket suspended by four operating ropes, two for opening and two for closing the bucket. The trolley track extends back over 40 feet from the rear leg over the V trough on the land side, supported on a cantilever extension to the main frame, while the boom allows the trolley to travel far enough out so that the bucket can reach the farthest side of a boat of 65 feet beam. These unloaders are the first Hoover & Mason machines to be built with horizontal booms and trolley tracks.

Two 36-inch drums, each geared to a 125-horsepower motor mounted in the trolley frame, are used to operate the bucket, one for closing and one for opening. The four bucket ropes are reeved over sheaves in the trolley, those from which the bucket is suspended being mounted on a rotating frame operated by a 7½-horsepower motor. This latter arrangement allows the operator to swing the bucket either lengthwise of the hatch to enter it, or crosswise of the hatch so as to reach the ore between the hatches.

The trolley is mounted on eight equalized wheels, four of them being motor-driven. The operator is stationed in a cab hung from the trolley frame and he controls all the motions of the bucket and the trolley as well from his cab. In addition to this, he controls the movement of the unloader along the dock when moving from hatch to hatch, by means of foot levers and controllers conveniently located on the floor of the cab within his easy reach. The trolley track is provided with stops and electric safety devices to prevent over-travel of the trolley in either direction, and a safety stop is provided on the front end of the main frame to prevent the trolley from traveling out over the water when the boom is up. The longitudinal movement of the unloaders is accomplished by means of motor-driven drums mounted on the front and rear truck beams, one on each leg. On each drum is wound several turns of 1-inch cable, the two ends of the cable being carried to opposite ends of the unloader runway where they are securely anchored. By rotating these drums, one set of cables is wound in while the other set is unwound. Both drums are connected by shafting and gearing to two 35-horsepower motors mounted on the main frame beside the weighing hoppers.

This arrangement for longitudinal travel provides for two ropes leading in opposite directions from a drum on each leg of the six machines, consequently there are six ropes running to the anchor at the end of the runway from the front legs and six to each anchor from the rear legs. The drums are so placed that these ropes do not interfere with each other and each machine can be moved independently of the others. A brake is provided on the horizontal connecting shaft on the frame, which is powerful enough to hold the machine from skidding on the track.

The boom is raised and lowered by means of cables, which are so reeved that the boom itself can be lowered until its weight is carried on the boom rods—that it, until it is horizontal—without disturbing the boom extension. Then by slacking still further on these same cables, the boom extension is lowered into a horizontal position. When raising the boom the extension is automatically folded up at right angles first before the boom proper begins to lift.

The boom hoisting drum is located just behind the connection of the mast brace, with the main tower on top of the frame, and is driven by a 50-horsepower motor, operated by levers and controllers on the main frame within easy reach of the man in the

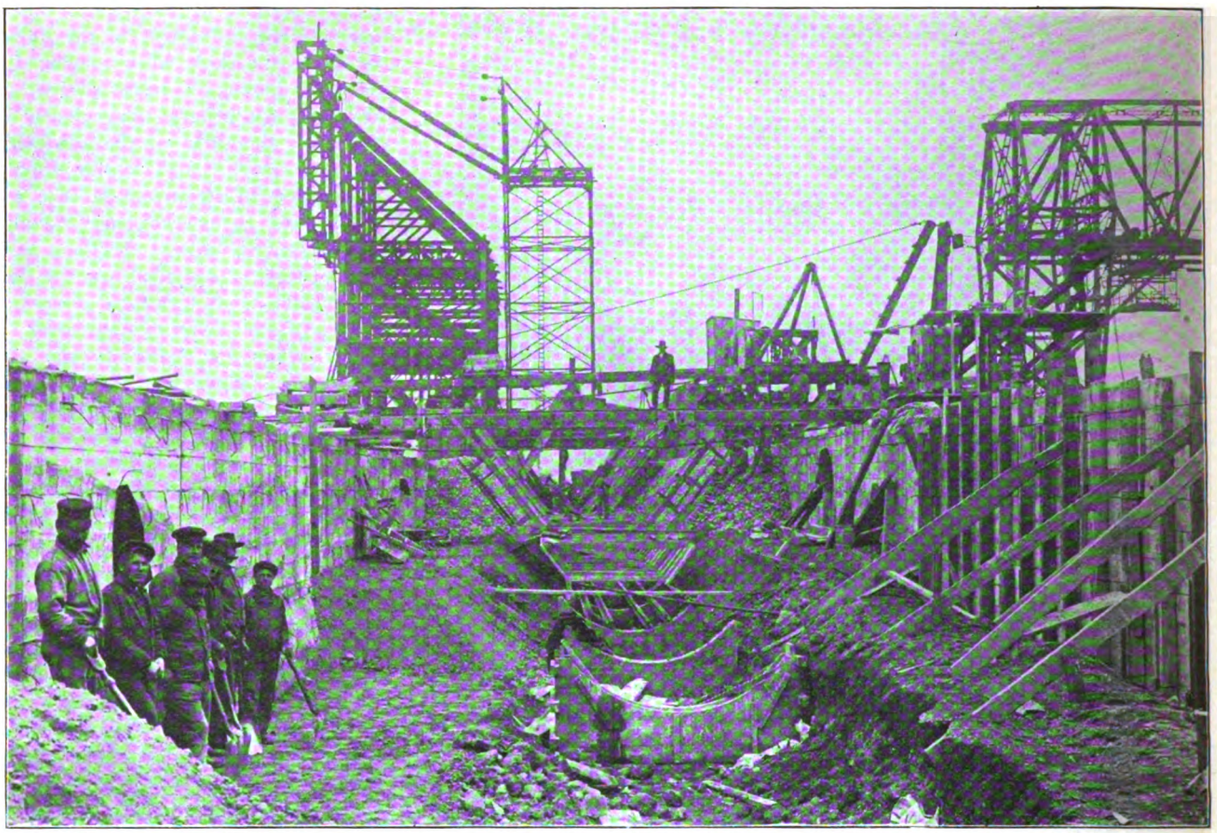

FIG. 3—V-SHAPED ORE TROUGH UNDER CONSTRUCTION.

FIG. 4—VIEW SHOWING GREAT LENGTH OF ORE BRIDGE AND A NEAR VIEW OF COMPLETED ORE TROUGH.

trolley cab, when the trolley is in position over the unloader tracks.

Supported in the main frame and directly above the tracks between the unloader legs is a two-compartment weighing hopper having a capacity of 180,000 pounds. At the bottom of each of the two chutes leading from this hopper is a smooth-faced drum mounted horizontally which can be rotated by means of a motor located in the space between the two compartments. By rotating these drums in opposite directions, ore is fed from the hopper into cars standing on the rear tracks under the unloader, and a car loaded in from 20 to 30 seconds. The hopper rests upon scales of special construction, which are read and operated by a weighman who walks along a plank walk supported on brackets on the water side of the trough, as shown in Fig. 4. These scales weigh accurately and cars are loaded uniformly to their maximum capacity.

Current is supplied to the six unloaders from an insulated bar iron conductor mounted on extended ties at the top of the wall supporting the rear legs. Contact shoes on the rear trucks carry the current from the conductor rails on to the unloaders from which point it is wired to the various electric motors needed to operate the machine.

The maximum capacity of each machine is over 300 tons per hour when unloading the first half of a cargo of ore. Four or five shovellers are required in the hold of the boat, to help clean up, but these are not necessary until the greater portion of the cargo has been unloaded automatically. With the new wide opening grabs now being installed—opening over 18 feet—the cleaning up labor will be brought to a minimum.

THE ORE REHANDLING BRIDGE.

In order to be able to stock the ore unloaded into the trough by the six machines previously described, a Hoover & Mason ore stocking bridge is provided on the land side of the trough which consists of a double riveted truss supported on two towers 242 feet center to center. Cantilevers about 150 feet long extend from the bridge beyond the towers at each end, making the total length of bridge about 550 feet. The cantilever at the east end extends over the ore trough and above the rear cantilevers on the unloaders. The two towers are heavy rectangular structural frames each carried on 32 wheels in pairs, mounted on springs, similar to standard railroad construction. These wheels travel upon runways of solid concrete on top of which are laid ties, with two standard T rails spiked to them. The truck girders are of heavy plate construction and either end is extended to provide for the mounting of a spool driven through gearing by a 35-horsepower motor. Around this spool is wound a steel cable which lays along the runway and is securely anchored at its far end. By turning the spool, the bridge is moved in either direction—longitudinally. The motion of the bridge is controlled from the operator's cab in the trolley which travels above. Each tower is carried on a roller nest on top of the truck girder which permits the bridge to skew about 15 degrees either side of the normal position, in case one tower in moving should for any reason get ahead of the other. This skewing also greatly assists in placing and delivering ore.

On the track which is supported from the cross frames of the bridge runs the man trolley which operates a 14-ton Hoover & Mason grab bucket. The trolley is carried on 10 heavy chilled wheels of which part of them are driven by four 35-horsepower motors geared to the axles. The bucket operating mechanism is similar to that on the trolley of the unloader with the exception that no mechanism is provided for turning the bucket to open lengthwise of the bridge as this is not necessary in stocking the ore, while on the unloaders the bucket has to be turned to open lengthwise of the hatch in order to go down into the hold.

The speed of travel of the trolley is about 800 feet per minute, while the speed of the bridge traveling longitudinally is about 60 feet per minute. The four 125-horsepower motors in the trolley, for hoisting, lowering, opening and closing the bucket are capable of hoisting the bucket and load at a maximum speed of about 175 feet per minute.

The man in the cab on the trolley controls all of the movements of the trolley bucket and bridge. The bridge traverse is accomplished by the two 35-horsepower motors located at the base of each tower, these motors being operated by controllers located in the cab of the trolley. Current is supplied to the bridge from conduit rails running along one side of the runway similar to those on the unloaders. In the tower nearer the river is a weighing hopper of the same general type as those on the unloaders. This is provided so that cars can be loaded to maximum capacity and accurately weighed direct from stock by the bridge itself. A single railroad track runs parallel to the runway and close to it.

The capacity of the ore pile under the main span of the bridge is over 600 tons per lineal foot—that under the cantilever on the water side is about 250 tons per lineal foot while the ore pile under the other cantilever will stock 350 tons per lineal foot. Thus the total ore stocking capacity of the bridge is over 1,200 tons per lineal foot, or about 970.000 tons in a length of 800 ft. of runway.

The bridge has a maximum capacity of 400 tons per hour, carried from the ore trough to the center of the main span. An excellent view of the bridge and unloaders at closer range is given in Fig. 4, which gives a better idea of the great length of the ore bridge and emphasizes the stability of the structural design.

OBITUARY.

Rear Admiral Joseph Bullock Coghlan, United States navy, retired, died suddenly Dec. 5 at the home of Charles Chamberlain, Sutton Manor, near New Rochelle, N. Y., where he and Mrs. Coghlan were staying preparatory to occupying their new home now nearing completion in New Rochelle. The burial took place in Arlington National Cemetery at Washington, Dec. 9. Admiral Coghlan had spent 45 very active years in the navy and there are hundreds of incidents recorded showing his bravery and efficiency, the most notable being the record of the great battle at Manila in which he commanded the cruiser Raleigh. Perhaps Admiral Coghlan's fame will be best perpetuated by the amusing incident of the "Hoch der Kaiser" poem which he recited at a dinner given in his honor at the Union League Club in New York and which created such a sensation as almost to amount to an international complication.

The scout cruiser Salem was given a standardization trial over the Rockland course last week. The maximum speed was 25.3 knots and her average speed on her three fastest runs was 24.9 knots.

The third of the great steel floats building at Fore River for the New York, New Haven & Hartford railroad, was launched last week. The float is 337 ft. long, 40 ft. wide, and is capable of carrying 28 loaded freight cars.

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December 31, 1908.

CONFERENCE ON INSURANCE.

Insurance rates on the great lakes during the past year have been so excessive that vessel owners have taken up the subject to the end that some plan of co-operation may be devised whereby risk can be lessened and rates lowered. Prior to 1907 valuation was at $40 per gross ton register. During 1907 it was advanced to $48.50 per gross ton for first valuation. The insurance rate was 4½ per cent with ⅜ per cent for protection and indemnity and 1⅜ per cent for total loss. The deductable average was $500. Vessel owners thought this policy pretty stiff, but the 1908 policy was more drastic yet. Valuation was based at $53.50 per gross ton, the rate advanced to 5 per cent with ½ per cent for protection and indemnity and 1⅜ per cent for total loss. Underwriters contended that the losses made the advanced rate imperative.

Some vessel owners considered this policy prohibitive and operated their fleets during 1908 without insurance. The most radical vessel owner, however, does not like to operate his ships without insurance. Accordingly a feeling has grown up among them for concerted action to minimize risks. Obviously there are certain risks which can be avoided, such as overloading, crowding in narrow passages and the desire to get ahead of the other ship. There is some talk of the owners carrying a certain percentage of the risk and in addition to put the loading of vessels and operation in the rivers under the regulation of a committee. While the whole thing is as yet in embryo, a meeting of the vessel men will be held in Detroit Jan. 18 immediately preceding the annual meeting of the Lake Carriers' Association to formulate some plan of concerted action. The annual meeting of the Lake Carriers' Association will probably be postponed until Jan 20.

CO-OPERATION ON A WIDE SCALE.

The center of the industrial stage abroad is at present held by Sir Christopher Furness, and quite rightly. In an endeavor to prevent labor disputes at his West Hartlepool yard he offered either to sell the yard to the workmen at a reasonable valuation or to form a plan of co-partnership. The workmen would have nothing to do with the proposition of buying the yard, but have voted to give the co-partnership plan a trial. Briefly the plan is this: The workmen will have 5 per cent deducted from their earnings, to be expended in buying the shares of the company, upon which a minimum dividend of 4 per cent is guaranteed by Sir Christopher. If there is a surplus profit at the end of the year, the employers first receive 5 per cent, and after depreciation and reserves are provided for, the remainder will be divided among the whole of the share holders, including of course the workmen who have taken shares.

In order that this plan might have a reasonable chance for working out, Sir Christopher himself placed orders with the shipyard for twelve steamers on behalf of another enterprise in which he is engaged. He did this in spite of the widespread depression now existing in the shipping trade, saying that he disagreed with those who maintained that there is a surplus of ships. He believed that of the 13,185,855 tons of vessels registered in the United Kingdom nearly 2,000,000 tons are practically obsolete. He maintained that a million tons of new tonnage to replace this would be of national advantage and advocated the scrapping of worn-out vessels as true economy.

These twelve ships were let at prices that had been secured from the Clyde, the Tees, the Wear and the Tyne, and in order to keep faith with these bidders Sir Christopher distributed contracts for eight vessels among them. He announced himself as prepared to stand personally any loss on the experiment. He expected, however, that by the time the vessels were completed that the state of industry would have generally revived and that they could be sold at a profit to ship owners wanting steamers. He stipulated that any profit on the re-sale of the steamships, however, should go to the present firm of Furness, Withy & Co., in consideration of its services in negotiating for their disposal. He expected by the end of 1909 to find industrial conditions generally prosperous and maintained that the future of this scheme gave him no concern whatever. He believed that having once experienced the practical workings of the scheme the workmen would be his co-partners for the balance of their lives.

Certainly if co-partnership upon a wide scale is ever to be successful, it should be successful in this experiment, because the company has eliminated every chance of failure that it is possible to foresee.

SHIP EMBARGO SUSPENDED.

In order that the Canadian shipping interest may have ample time to construct or procure suitable vessels of a gross tonnage above 1,500, to replace foreign vessels barred from the Canadian coasting trade, after

Jan. 1, by an order-in-council, the government has lifted the ban on all steamships of not less than 1,500 tons gross until 1911, although withdrawing the privileges from vessels under that class.

The former regulations which shut out all vessels flying foreign flags from the coasting trade between Quebec and Nova Scotia was prompted by an organized movement among Canadian shippers to procure better opportunities for their native vessels, of which they claimed they were deprived, because of the large numbers of foreign vessels employed.

Most of the ships affected by these orders are used in carrying coal and steel, and owned in Italy, Germany, the Netherlands, Sweden, Norway, Austria-Hungary, Belgium, the Argentine Republic and Japan.

PIG IRON SITUATION.

The year closes with the pig iron and finished products markets very quiet, but with no evidence of weakness. Taking of inventories has undoubtedly postponed the placing of considerable business. A number of fair sized inquiries for pig iron for the first quarter are out, and considerable buying is expected before Feb. 1. Railroads continue to buy large quantities of spikes and track fastenings as well as locomotives. Specifications on steel bars are coming out in satisfactory volume, and there is more general contracting for sheets. The tin plate outlook is encouraging, and the merchant pipe business has been very satisfactory. Since nearly all furnaces in blast or intending to blow in shortly have contracted for their first half year requirements, the demand for coke is not active.

MARINE ENGINEERS AND INDIVIDUAL CONTRACTS.

The Marine Engineers' Beneficial Association is not taking kindly to the fact that its members are entering into individual contracts with vessel owners, and a meeting will be held in Cleveland, on Jan. 11, to consider what action is to be taken on the premises. Charges have been preferred against a number of the engineers of the Pittsburg Steamship Co.'s fleet, who signed contracts last spring and have renewed these contracts with the company. Only six chief engineers in the Pittsburg fleet declined to sign contracts and their places were filled by the promotion of assistants to first place. Nearly all of the second engineers in this fleet have also signed contracts. Contracts have also been entered into individually with the engineers of Pickands, Mather & Co.'s fleet. Other vessel owners expect in the near future to enter into individual contracts with their engineers.

STEERING GEARS OF LAKE SHIPS.

Editor MARINE REVIEW: The question of steering gear is always to the fore with every master and is always under discussion with us on the coast, as I assume it is on the lakes. With the numbers of large ships continually building on the great lakes, of a type in which the gear extends practically the whole length of the ship, your masters must have exceptional opportunities of judging of the comparative merits of the different arrangements which I understand are freely used. Before coming to a decision on a proposed installation I would very much like to obtain the judgment of some of the masters of the great lakes as to what they found the most satisfactory arrangement, that is to say, whether with steering engine forward or aft, and, if the former, as to the best method of connection to the rudder quadrant, with wire rope, rods or chain. If the latter, as to the relative merits of telemotor, shaft, wire or rod transmission. Of course I am assuming the use of some standard type of steering engine.

Can one of your large ships be steered by hand from forward and what is the best rig? As no device is perfect, what do you find the chief troubles with different forms and what modifications would you suggest? As the only man who can say whether a steering gear is good, bad or indifferent, is the master, assuming of course that the gear has proper care, and is operated intelligently or with intelligence which it must be supposed to meet in service, I think an expression of opinion would be good for all concerned, and am sure it would be appreciated by,

A COAST MASTER.

Philadelphia, Dec. 23.

REORGANIZING NAVY YARDS.

Secretary of the Navy Newberry has evolved a comprehensive scheme for the reorganization of the navy yards. He believes that the bureau system which has prevailed in the yards should be eliminated so that administration may be much simplified and the commandant of the yard be in more direct touch with the work to be done. It is probable that the system of accounting will be modernized and made uniform for all the navy yards, so that a comparison can be made of the cost of manufacturing the various articles used by the navy, and the work can be concentrated in every yard where it can be done cheaper. In this connection Caspar F. Goodrich, commandant of the New York navy yard, has completed and forwarded to the navy department a report recommending that the several machine shops at the yard be consolidated. About a year ago Secretary Newberry, who was then assistant secretary of the navy, authorized that the paint, pattern and carpenter shops at the navy yards on the Atlantic coast be consolidated.

Under the former administration of the navy yards there was a series of bureaus similar in nature and functions to those of the navy department. Each yard had a bureau of steam engineering, a bureau of construction and repair, and so forth. Often it happened that each of these yard bureaus had a separate paint shop or a separate carpenter shop or a pattern shop of its own, each conducted by a different foreman. Each of these shops did similar work under independent direction. The first step in the reorganization of the navy yards was the gradual consolidation of the small independent shops into one large shop. The consolidation of the paint, pattern and carpenter shops at the various Atlantic coast yards was ordered last spring, and it has worked so satisfactorily that the consolidation has been extended to the two large navy yards of the Pacific coast.

The new White Star liners Laurentic and Megantic are progressing rapidly at the yard of Harland & Wolff at Belfast, Ireland. An interesting feature of their construction is the work of that company's new floating crane which has been used for lifting the machinery of the Laurentic into place. The Megantic is still on the stocks, but it is expected that she will be launched some time this month.

The specifications for the ballastic tests of the protective deck plate material for the battleships Florida and Utah require a resisting power more than 50 per cent greater than that previously required for this class of material. The bureau has not specified vanadium steel but "special treatment" steel, which will meet the physical tests required.

DEATH OF JAMES CORRIGAN.

James Corrigan, head of the firm of Corrigan, McKinney & Co., died at his home, 8114 Euclid avenue, Cleveland, on Dec. 24, of peritonitis. He was stricken with the disease in his country home in Wickliffe last September and was critically ill there for several weeks, but later appeared to be well on the road towards recovery. He suffered a relapse at the city home, however, from which he found it impossible to rally.

The history of James Corrigan's life is that of a man who succeeded in business through the possession of a bold and original mind though denied every advantage of early training and education. He was born on May 1, 1848, at Morrisburg, Ont. His mother died when he was 11 years old, leaving five children. His father married again shortly thereafter, and James, with his elder brother, John, finding the home not congenial, left it to make their living together. They went to Oswego, N. Y., where they made their living sailing on the lakes.

John Corrigan later went to Cleveland and engaged in the oil business. James had meanwhile purchased the little schooner Trial, and, after sailing her on the lower lakes, took her to Cleveland with the intention of entering the fruit trade. He, however, abandoned this for the more lucrative business of oil refining. In this business he thrived, winning huge profits, and conducted it as an independent refinery until 1881 when he entered the Standard Oil combination.

In the interim, however, he had not suffered his lake interests to lapse, continuing to add to his fleet of vessels as the commerce of the lakes increased. His early investments were in schooners. Among those which he owned were the Niagara, Lucerne, Polynesia, Northwest, J. M. Hutchinson, Halleran, Michigan, Marion Page, Charles Foster, Frank D. Owen, Iron Cliff, David Dows, George W. Adams and many others. As the trade grew and schooners became too slow, he added steamers to his fleet and at one time or another owned the steamers Raleigh, Aurora, Roumania, Australasia, Bulgaria, Caledonia, Italia, J. Emory Owen, St. Paul, M. M. Drake, Quito, Minnesota, Iron Age, Iron Duke, Iron Chief, Wallace, Australia, Amazon, Polynesia and Aurania.

James Corrigan was one of the earliest to recognize the limitless possibilities of the Lake Superior iron country for the creation of wealth and it was a natural step from the carrying of ore to the mining and smelting of it. He became a consistent buyer of Lake Superior ore properties and at the time of his death was the most extensive independent operator on the ranges. On the Mesabi range the firm owned the Admiral, Commodore, Jordan, St. James, St. Paul, Stevenson and Wallace mines; on the Gogebic, the Colby, Colby No. 2, Ironton, and Ironton No. 2; on the Menominee the Armenia, Baker, Basic, Crystal Falls, Dunn, Fairbanks, Genesee, Great Western, Groveland, Kimball, Lamont, Lincoln, Paint River, Quinnesec and Tobin; on the Marquette the Star West mine.

One illustration alone will suffice to show Mr. Corrigan's daring temper as an operator in iron mines. When the steel corporation was formed the Stevenson mine was passed over as a doubtful asset. Corrigan, McKinney & Co. acquired it and poured thousands into exploration and development, with the result that in the second year of the new ownership the mine produced nearly 1,500,000 tons at an average profit for that year of about $1 per ton.

His firm's furnace interests embraced the Genesee Furnace Co., at Charlotte, N. Y., the Scottdale Furnace Co., at Scottdale, Pa., and the Josephine Furnace & Coke Co., at Josephine, Pa. At Josephine, the firm founded a town as well as a furnace. He had also planned to build a new furnace on the Cuyahoga river at Cleveland, under the name of the River Furnace & Dock Co. This is expected to be in operation in 1910. Mr. Corrigan also held extensive copper interests in Mexico. Of late years he had gradually abandoned the operation of vessels, the existing fleet

JAMES CORRIGAN.

of Corrigan, McKinney & Co. consisting only of the Australia, Amazon, Polynesia and Aurania.

In personal character, James Corrigan was a plain, blunt, straightforward man. In all his dealings, he never beat about the bush. His method of attack was direct and everyone knew precisely where he stood. He was a fearless, earnest man, who took great losses and great gains with equal composure. He was one of the group of giants who as young men in the 70's began to develop the latent natural resources of the country. He was associated in business with many men now recognized as industrial captains. Considerable newspaper space was given to his controversy with Mr. Rockefeller regarding the purchase by Mr. Rockefeller of some Standard Oil stock which had been offered as collateral for loans made to develop Lake Superior iron mines. Whatever may have been the morality or ethics of the transaction, successive courts held that Mr. Rockefeller was well within his legal rights. The case attracted national attention, owing to the fact that Mr. Rockefeller's brother, Frank, was associated with Mr. Corrigan in the mining enterprises and both felt that they had not been fairly dealt with.

It was largely through James Corrigan's influence that the Cleveland Vessel Owners' Association was consolidated with the old Lake Carriers' Association in 1892 and in 1894 he was elected president of the Lake Carriers' Association.

His life was strenuous from beginning to end. Everything about his career was uncommon. Both fortune and fate dealt largely with him. The severest blow of all was the almost total extinction of his family by the capsizing of the schooner yacht on Lake Erie about six years ago. He had been on a cruise with his family and, not having further time to spare, had left the yacht in Detroit, taking the train to Cleveland. The yacht proceeded down the river to Lake Erie and was capsized near the islands.. In that disaster, he lost his wife and three daughters, a grandchild and a niece. Mrs. John Corrigan was the sole surivor. She happened to be on deck and was rescued by a small boat that was near by. All the rest were in the cabin when the Idler capsized and had no chance to escape. The only surviving child of James Corrigan is his son, James W., the only member of the family who was not aboard the Idler at the time.

NEW RECORD

For Ore on Docks at Close of Navigation—Receipts at Erie Ports.

The figures compiled by the MARINE REVIEW from the returns sent in by the various dock companies show that iron ore receipts at the Lake Erie ports during the season of 1908 were 20,414,491 tons, out of a total movement of ore by lake of 25,427,094 tons. Lake Erie docks on Dec. 1 held a balance of 8,441,533 tons, which is the largest store on hand in the history of the traffic, the previous high figure being in 1907, when 7,385,728 tons were on hand. During 1907 the total shipment by lake was 41,288,755 tons, of which Lake Erie docks received 35,195,758 tons and held a balance on Dec. 1, 1907, of 7,385,728 tons. During 1906 the total shipment by lake was 37,513,595 tons, of which Lake Erie docks received 32,076,757 tons and held a balance on Dec. 1, 1906, of 6,252,455 tons. The reserve of 8,441,533 on Lake Erie docks Dec. 1 is ample for winter consumption. Never in the history of the trade has 5,000,000 tons gone forward from dock to furnace during the winter season.

Shipments to furnaces between May 1 and Dec. 1, 1908, aggregate 17,453,258 tons, compared with 29,787,018 tons in 1907, compared with 27,615,392 tons in 1906, with 24,311,720 tons in 1905, with 16,658,806 tons in 1904, with 16,903,013 tons in 1903, with 18,423,364 tons in 1902 and with 14,204,596 tons in 1901.

The shipments to furnaces during the season of navigation as referred to are determined in this way: First we have the amount of ore on Lake Erie docks before the opening of navigation May 1, last, 5,480,300 tons; add to this the receipts of the season just closed, 20,414,491 tons, and the total is 25,894,791 tons; deduct the amount on dock Dec. 1, 8,441,533 tons, and we have 17,453,258 as the amount that was forwarded either direct or from dock to furnace yards. It is, of course, understood that the difference between the total output of 25,427,094 tons which was shipped from the Lake Superior mines during 1908, and the receipts of 20,414,491 tons at Lake Erie ports, is ore that went to places other than Lake Erie ports, such as the furnaces at Detroit and South Chicago. The accompanying table shows receipts at Lake Erie ports and amounts on dock during six years past:

IRON ORE RECEIPTS AT LAKE ERIE PORTS, GROSS TONS.

Ports.	1908.	1907.	1906.	1905.	1904.	1903.
Toledo	680,553	1,314,140	1,423,741	1,006,855	508,792	652,305
Sandusky	.....	83,043	35,847	51,202	48,356	130,532
Huron	213,377	971,430	778,453	825,278	231,364	486,106
Lorain	2,286,388	2,621,025	2,191,965	1,605,823	972,931	990,490
Cleveland	4,240,816	6,495,998	6,604,661	5,854,745	3,572,228	4,434,160
Fairport	1,518,961	2,437,649	1,861,498	2,008,621	1,157,858	1,434,342
Ashtabula	3,012,064	7,521,859	6,833,352	6,373,779	3,639,250	4,242,160
Conneaut	4,798,631	5,875,937	5,432,370	5,327,552	4,083,655	3,903,937
Erie	828,602	2,294,239	1,986,539	2,112,476	1,284,778	1,257,798
Buffalo & Tonawanda	2,835,099	5,580,438	4,928,331	3,774,928	2,433,601	2,194,901
Total	20,414,491	35,195,758	32,076,757	28,941,259	17,932,814	19,681,731

IRON ORE ON LAKE ERIE DOCKS, DEC. 1, GROSS TONS.

Ports.	1908.	1907.	1906.	1905.	1904.	1903.
Toledo	590,925	518,645	281,000	368,024	318,573	106,710
Sandusky	36,079	44,546	17,467	52,977	75,134	95,275
Huron	458,158	415,730	245,499	208,023	182,495	253,249
Lorain	426,274	366,271	336,321	271,695	299,504	288,581
Cleveland	1,458,392	1,281,335	1,224,606	1,330,619	1,237,033	1,337,750
Fairport	835,821	523,981	590,783	759,961	660,420	845,946
Ashtabula	2,293,531	2,056,820	1,631,312	1,589,951	1,403,575	1,911,911
Conneaut	1,296,675	1,090,774	1,057,424	976,976	684,487	591,364
Erie	730,530	652,219	552,631	564,961	583,439	657,409
Buffalo	315,148	435,407	315,412	315,780	318,739	282,890
Total	8,441,533	7,385,728	6,252,455	6,438,967	5,763,399	6,371,085

INTERSTATE COMMERCE COMMISSION RULING.

That the ruling of the interstate commerce commission is having the effect of giving the Pacific carrying trade to the British steamship lines is evidenced by the cargo on the Canadian Pacific railway liner Empress of Japan, which left Yokohama for Vancouver on Nov. 16. American shipping firms prophesied that their lines would be out of the running if the through freight rates had to be published, and their assertions have proved correct. The service between Vancouver and the Orient has gradually been winning the trade from rival liners, and now the British ships will have only Japan to compete with. The Empress of Japan is bringing over to Vancouver this trip 1,500,000 lb. of overland freight and 520 tons raw silk. This shipment is the biggest silk consignment brought into Vancouver for a long time.

PACIFIC COAST NOTES.

Office of the MARINE REVIEW,
302 Pioneer Bldg., Seattle, Wash., Dec. 26.

Messrs. Arthur, Fred and Gerald Seaton, formerly of Vancouver, B. C., will open a new shipyard in New Westminster, B. C., soon after Jan. 1. The new firm has acquired the interests of Joseph Crane; the properties transferred include a large floating dry dock at the foot of Fourth avenue, and the marine ways on Lulu Island known as Crane's ways. Important improvement to the plant will be made at once, including the addition of a machine shop and an up-to-date wood working plant. The Seaton brothers will engage in all kinds of boat building and repairing and will specialize on fine yachts.

Work on the six old clipper ships recently bought by the Coastwise Steamship & Barge Co. and which are to be transformed into barges for freighting rock has already begun. The work to be done includes taking down the yards, top and topgallant masts and upper gear and enlarging the hatches. About $3,000 will be expended on each ship. The James Drummond is being dismantled at Eagle harbor by Hall Bros. Marine Ry. & Shipbuilding Co. and the Carondelet is being transformed by Philip D. Sloan. It has not been decided who will do the work on the remaining four ships.

The hospital ship Relief, which came around Cape Horn with the Atlantic fleet and is now in the Philippines has been declared unseaworthy and will probably be stationed as hospital station ship at Olongapo, P. I., hereafter.

Several foreign vessels well known on the Pacific have recently changed hands. The former German steamer Marcellus is listed now as Johanna, flies the Swedish flag and hails from Stockholm. The British bark Sussex has been sold to the Italians and another British bark, Clan Buchanan, has been purchased by Norwegians and renamed Valerie. These vessels are all engaged in the Puget Sound deep sea lumber trade.

The contract for building the government boarding boat for the local government quarantine service has been awarded to the International Contract Co., Seattle, for $16,500.

Advices received from Chefoo by the British steamer Suveric state that the Japanese steamers Nagata Maru and Ginsei Maru both foundered recently near Chefoo. In a strong gale the engines of the Negata Maru broke down and the helpless vessel was hurled on the shore. But one Chinaman survived of all the passengers and crew. No one on the Gensei Maru was saved and it is not known how she met her fate.

The burning oil steamer Kaloma, 3,209 tons net, which had become unmanageable and dangerous in the harbor of Singapore was sunk by solid shot from the harbor fort, Dec. 18.

The United States steamer Supply is expected to arrive at the navy yard, Puget Sound, shortly for extensive repairs which will require an expenditure of $100,000 in labor alone.

The new steamship lines between the Pacific coast and the Hawaiian islands are being organized in southern California. One is to be incorporated by capitalists of Los Angeles and the other is planned as a subsidiary of Senator Clark's new railroad, the San Pedro, Los Angeles and Salt Lake. The projected lines are to make Los Angeles their principal Pacific port, and both are designed to care for the rapidly growing canned pineapple and sugar freight and tourist passenger traffic between the Pacific coast and Hawaii. The freight hauls both ways are considered to be sufficiently heavy to make both lines pay.

Passing through exceptionally heavy weather which swept away everything from her decks that was not securely bolted down, the Nippon Yusen Kaisha steamship Iyo Maru arrived in Seattle Dec. 23, 24 hours ahead of her schedule. The Iyo Maru brings the last oriental importations into Puget Sound this year. Included in her cargo is 500 bales of raw silk.

The new Puget Sound steamer Vashonian, built by Philip D. Sloan, Seattle, underwent an informal trial trip Wednesday, Dec. 23. With a small party of invited guests the smart new steamer left Galbraith Dock, Seattle, at 11.07 A. M. and steamed to Vashon and return. No attempt at speeding was made; the trip being made merely to test the machinery and seagoing qualities of the new craft. No unpleasant accidents marred the trip. The Vashonian is not quite finished and will not be placed on her regular run for several days. Among those on board during the trial were L. H. Coolidge, the designer of the hull; Philip D. Sloan, the builder, George Sloan, A. D. Cowan, president of the Vashon Steamboat Co., C. J. Buckley, H. H. Harrington, Fred Beal, Louis Brewster, H. Cole Estep.

ATLANTIC COAST NOTES.

Office of the MARINE REVIEW,
Room 1005, No. 90 West St.,
New York City.

The Vasari, the new passenger and freight steamer of the Lamport & Holt service between New York, Brazil and the Argentine Republic, was launched last week at the Dixon shipyard, Middlesborough, England. The general dimensions of the Vasari are: Length, 502 ft.; breadth, 59 ft., and depth, 38 ft. 3 in. Her engines, built by the Richardsons, Westgarth & Co., will gve the steamer a speed of 14 knots per hour. There will be accommodation for 200 first-class and a large number of steerage passengers, the new vessel being luxuriously fitted throughout.

Beckett Hill, the Liverpool manager of the Allan Steamship line, died in that ciy on Dec. 27.

The steamship Pretoria, of the Hamburg-American line, arrived at New York this week considerably overdue through stress of weather. On Dec. 13 she logged just 41 miles, and only 52 on the 16th.

The steamers Admiral Schley and Seguranca, from Port Antonio, Jamaica, and Cuba, arrived at New York on Monday and reported passing the derelict schooner Warner Moore off the Virginia coast. The Warner Moore was abandoned in a waterlogged condition on Christmas day. The United States derelict destroyer Seneca was standing by the derelict, awaiting smoother seas before beginning the work of destruction.

There was a total of over 4,000 passengers passed into the harbor of New York last week above the number passing out. Since the year opened steerage departures have been 657,931, arrivals 400,807, excess departures 257,124. Excess arrivals for 1907, in the same period, were 814,643.

On account of the lack of dry docking facilites at Philadelphia, the Norwegian steamer Wacousta left

that port for New York last week to be docked for examination and repairs. The Wacousta brought a cargo of iron ore from Newfoundland to Philadelphia, and sustained some damage by heavy weather. She will return to Philadelphia after the repairs are made to load a cargo of wheat for the Mediterranean.

The Cuban government steamer Correos was towed into Norfolk last week, having suffered considerably from the effects of heavy weather. Her deck housings and fittings were smashed. The Correos sailed from New York and was caught in the storm short of provisions.

The British steamer Irada, which sailed from Galveston on Dec. 5 for Liverpool, has been totally wrecked on the southwest point of Mizzen Head, coast of Ireland. Captain Roberts, a stewardess and four sailors were drowned. The remainder of the crew of 35 saved themselves by climbing the face of the cliffs. The steamer was driven ashore by heavy weather in a dense fog, and was loaded with cotton. She was 501 feet long, 59 feet beam, 33 feet deep and of 5,334 net register.

The steamship Cheyenne, a new vessel built for the bulk oil carrying trade on the North Atlantic, in England, left Newcastle-on-Tyne on Dec. 21 for Philadelphia. She belongs to the Anglo-American Oil Co.

The Cuban steamer Camaguey arrived at New York last Friday with her port quarter damaged through collision at sea with the steamer Julia Luckenbach. The Luckenbach was bound for Porto Rico from New York, and after the collision proceeded to Newport News.

The Major Reybold, one of the oldest river vessels, arrived at Camden overdue through stress of weather, last week from Salem, N. J., on her last run. The Reybold will be broken up for the old material in her hull. She was built at Wilmington in 1853.

The Cunard liner Lucania arrived at New York on Saturday somewhat She had 2,400 sacks of Christmas mail.

This year's oil exports from Philadelphia, will exceed those of 1907 by several million gallons. Both 1907 and 1908 are among the banner years of the port's oil shipments. The exports this year have been 422,000,000 gallons, a gain over last year of nearly 5,000,000 gallons. This does not include shipments to the West Indies and South America.

The Cunard Line declines to confirm the reports that the steamers will begin calling at Cherbourg, France, as well as at Queenstown, Ireland, on their eastward voyages, commencing next spring. The matter has been discussed by the directors of the line for some time, the advantages of landings at Channel ports having become apparent to all of the trans-Atlantic lines, who nearly all have taken advantage of it.

QUESTIONS FOR MASTERS AND MATES.—NO. 22.

325. The variation is six degrees westerly, the deviation four degrees westerly, the compass course is NE, what is the true course?

326. Am on the course from Chicago to Pt. Betsey, and after running 60 miles on the course find by an azimuth that compass course is ⅜ of a point in error, how many miles am I from the real course and how much must I alter course to counteract this error of ⅜ point? Figure this out without chart, parallel ruler, etc.

327. In a calm steaming 12 miles an hour, steering SE, what is the apparent direction and force of the wind to those on board?

328. Wind from SW with a velocity of 11 miles an hour, what direction and elocity will the wind apparently be to those on board of a vessel steaming 11 miles an hour steering NE?

329. Wind north with a velocity of 25 miles an hour, what direction and velocity will the wind apparently be to those on board of a vessel steaming 12 miles an hour and steering due north?

330. Vessel steaming 10 miles an hour steering east, the apparent direction of the wind to those on board is south with a force of 20 miles, what is the true direction and velocity of the wind?

331. The compass course is NE and the correct magnetic course NE¾ N, what is the deviation and which way is it?

332. Pitch of propeller wheel is 14 ft., what should speed of boat be per hour with engines making 90 revolutions per minute and no slip of wheel?

333. This same boat actually makes 12 miles an hour, how much is slip of wheel equal to and what is the percentage of slip?

334. Is the slip of the wheel as great running slow as when running fast?

335. A steamer making a speed of 10 miles per hour has a course of SW to make good, what must she steer in order to counteract a current setting NW at the rate of four miles an hour?

336. The true course is S by W, the deviation is ½ point easterly, and the compass course is S ½ W, how much is the variation and which way is it?

337. If you fetched to the westward of the course from Presque Isle to Detour, how could you determine it from sounding in thick weather?

338. Why is it ordinarily that a boat makes better time going south along the west shore of Lake Huron than coming north?

339. How could you tell in clear weather whether your ship was being influenced by a current or not?

ANSWERS TO QUESTIONS FOR MASTERS AND MATES.—NO. 22.

325. NE ⅞ N.

326. 4.4 miles from course. Alter course ⅛ point to counteract the error.

327. SE 12 miles.

328. Apparently no wind.

329. N 37 miles.

330. SSW ½ W 23 miles.

331. ¾ point westerly.

332. 12.4 nautical miles or knots. 14.1 statute miles.

333. Two miles per hour, or 16.1 per cent.

334. No.

335. SSW.

336. No variation.

337. By getting soundings of 42, 27, 25, 22 and 17 fathoms.

338. The current sets south along the shore and the boat is going with it.

339. By the drift of the vessel as indicated by the angle her wake makes with the fore and aft line of the ship. By the log line. By cross bearings along shore.

The American Bridge Works at its Ambridge plant launched recently a towing steamer for the Louisiana Railroad & Transportation Co. The steamer was christened Sarah Edenborn and is 135 ft. long, 32 ft. beam and 5 ft. deep, being of the stern wheel type with a 24-ft. wheel. The bridge company is also building a barge for the Louisiana Railroad & Transportation Co. to be named Naples and to be towed by the Sarah Edenborn.

Naval Architects and Marine Engineers.

Mr. W. Carlile Wallace's paper entitled "Some Recent Inventions as Applied to Modern Steamships," was the concluding paper of the first day's session of the Society of Naval Architects and Marine Engineers. Its text was as follows:

It is 12 months almost to a day since the Mauretania, the second of the big Cunarders, sailed into the port of New York. At that time the thoughts of the whole marine world were centered on these two vessels, and speculation was rife as to whether they would be able to fulfill their speed guarantee, a few engineers on this side of the water being kind enough to state that the Lusitania had achieved her utmost on her maiden voyage.

As the representative of the builders of this vessel I am extremely pleased that these gentlemen have turned out to be false prophets, as I was always satisfied they would. I am also satisfied that when the Mauretania again heads for this side, and settles down to work, she will give an equally good account of herself.

In vessels of the Lusitania class, speed is not the only desideratum; safety and comfort are now looked upon by passengers as two very important factors in enabling them to decide on which vessel they will book their passage. From this point of view it will not, I think, be out of place to lay before this society a few particulars of some more or less recent inventions, which I believe tend towards the attainment of these requirements.

The Lusitania and Mauretania, as no doubt my hearers are aware, have the most complete system of water-tight compartments of any vessel afloat, and they would float quite safely with any two of the main compartments full, a condition possible if a collision carried away one of the transverse bulkheads. In addition to the cross bulkheads the vessels are further protected by the two fore-and-aft bulkheads forming the high-pressure turbine rooms and the making of the coal bunker sides water-tight forward from the engine room for 100 frame spaces, so that were the bulkheads without opening of any kind below the main decks the vessel would be practically unsinkable.

The idea of building vessels without doors in the bulkheads has been adopted by one at least of the trans-Atlantic companies, but an attempt to follow out this plan on the new Cunarders would make them absolutely unworkable as there are three transverse and two fore-and-aft bulkheads dividing up the engine space proper, and four transverse bulkheads in the boiler space counting the one next the engine room, not to mention the bunker sides at all.

The next best thing to having no doors in the bulkhead is to provide a means by which every bulkhead door in the vessel can be closed from the bridge in a matter of a comparatively few seconds, either in very thick weather, when a collision is imminent, or after a collision has occurred.

For the safety of the crew and for the convenience in working the vessel, any arrangement for doing this must possess the following qualification. First, it must be possible under ordinary conditions at sea or in port to open and close the doors at will, leaving them either open or shut, as may be required for the convenience of the working staff. Second, before the doors are closed from the bridge an automatic warning must be given to those below that the doors are about to close, when they must close slowly, but surely, not drop suddenly, as this might result in a serious accident. Third, after the doors are closed from the bridge it must be possible to open any individual door to allow the escape of an imprisoned man, the door closing automatically after his release. Fourth, in the event of water entering any compartment to a dangerous extent, the doors not having been closed from the bridge, the doors in immediate proximity to this compartment must close automaticaly, shutting it off from the rest of the vessel. And last, the means adopted for closing the doors must be such that even when the mechanism is submerged it will still perform its work. Four mediums are available for doing this work—steam, air, water and electricity.

Steam is inadmissable for several reasons, the principal one being that in the event of a steam pipe bursting through a collision or otherwise, it would become a menace to life rather than a life-saving appliance. The pneumatic system has been tried and found wanting, to say nothing of its being too expensive, so it may be set aside.

Electricity has been used with considerable success in this country, but has objections, which appear to the writer to relegate it to the second place as a means for opening water-tight doors. Among them may be mentioned the possibility of blow-out of fuses or injury to the motors actuating the doors, through overload, the risk of short circuit should the gear for actuating the door or the conductors become submerged, and the great difficulty of locating or remedying a fault in the system if the conductors are protected as they should. For these reasons hydraulic control seems to fulfill, more nearly than any other, the requirements necessary to a thoroughly reliable water-tight door-closing system.

The doors of the two large Cunarders, also in the Carmania and Coronia, are actuated by means of a hydraulic system, which has been carefully worked out and embodies in the fullest possible manner all the requirements as already set forth.

Plate 1 shows the system as applied to the Lusitania, the arrangement in the Mauretania being identical, with the exception of the position of the pressure pumps and possibly some minor details.

The pumps are supplied with steam from the main boilers, and are two in number, of the duplex double-acting type capable of maintaining a pressure of 700 pounds per square inch throughout the hydraulic mains. Both pumps normally are under steam but either of them are of sufficient capacity to close the whole 36 water-tight doors in the vessel in from 15 to 20 seconds when making 40 strokes per minute.

Steam accumulators were fitted in the earlier installations, but as these were found to be clumsy, expensive, and inconvenient, they have been dispensed with in the new Cunarders and other recent vessels, the pumps being so proportioned that immediately on their receiving steam they get away at once at full speed, the supply of steam being regulated by a hydraulic governor so sensitive, that the moment there is a call made on the mains, whether due to opening or closing a single door or closing all the doors, the slight fall in pressure starts the pump away and maintains a steady pressure of 700 pounds on the mains, whether the pumps are only just moving to supply any small leaks or slip or when they are running full speed, closing all the doors.

The pump governor on the Lusitania and Mauretania is one of the very few purely American inventions on board these vessels, having been manufactured and supplied by a New York concern.

Plate 2 is a section of this governor and it is specially interesting on account of its extreme simplicity. There are no diaphragms to crack or pilot valves to get out of order, the whole secret of its success lying in the siphon below the controlling cylinder, which, being filled with heavy oil, keeps it there, thus preventing access of water in the working parts and at the same time keeping them efficiently lubricated.

This governor can be used equally well for controlling the pumps on the fire or sanitary lines in a passenger steamer, in the latter case obviating the necessity for a tank and overflow.

The pumps draw their supply of fluid from a 300-gallon tank placed near them in the engine room. The fluid is composed of a mixture of glycerine and water to form a non-freezable compound and at the same time secure a suitable lubricant and preservative for the leather in the valves and cylinders.

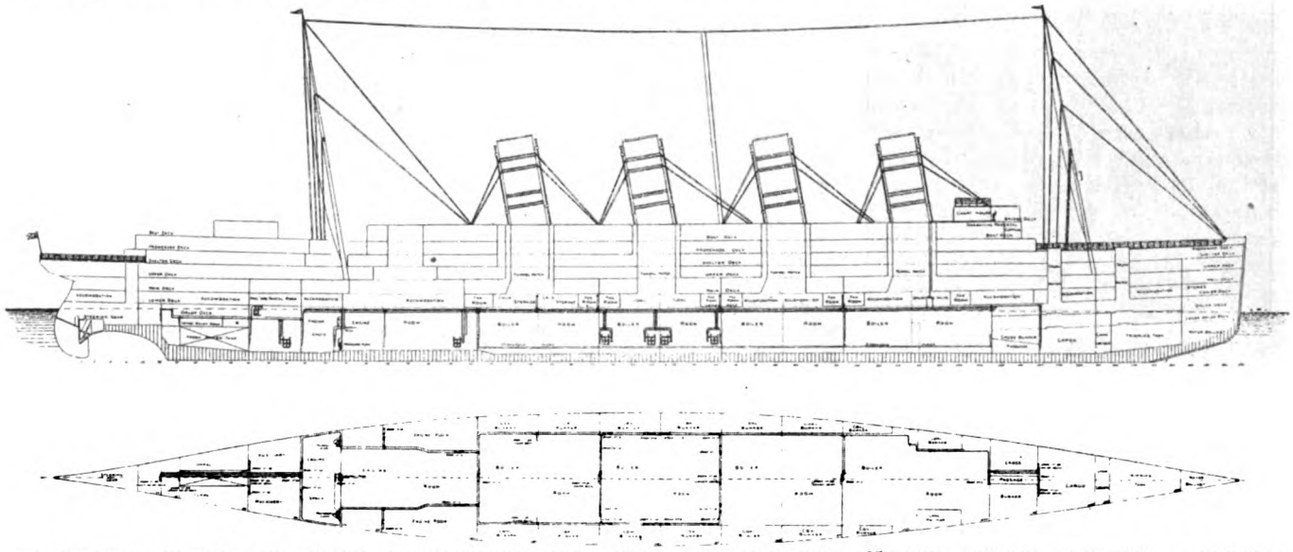
Hydraulic pressure is supplied to each of the doors by a pressure main, which runs around the vessel. A branch from the pressure main feeds an operating valve, which is placed on the casing of the forward boiler-room, so that the pressure may be led into a small pilot main, called the "closing main," which also runs round the vessel to serve the doors.

The operating valve is connected by telegraph wires and chains to a pedestal on the bridge, so that pressure may be let into the closing main, either by the operating valve itself, or by the pedestal on the bridge.

The doors are of the ordinary wedge type, and are formed of steel plate, suitably stiffened. They are each operated by a hydraulic cylinder, having two pistons connected by a rack, which gears with a pinion carried by a cross shaft; the shaft prolonged forms the door-shaft, which in turn carries the driving pinion, gearing with the rack on the door. When space prohibits the fitting of the cylinder in the immediate neighborhood, intermediate shafting, with bevel wheels, can be arranged and the cylinder be placed in any convenient position.

The pistons are of slightly different sizes, so that a larger force is available to open the door, or bring it off its wedges. But the successful working of the system may be said to lie with the controlling valve, which is placed at each door. It consists of a tubular ram, which slides in a casing and is operated externally by a lever. The ram carries at its center an ordinary slide-valve, which slides over three ports. These ports lead respectively to the opening and closing ends of the cylinder, and to an exhaust main, which runs around the vessel, and delivers into the supply tank. The pressure from the main is constantly behind the slide-valve, so that according to the position of the latter, the pressure flows either to the closing or to the opening of the cylinder, the other end meanwhile exhausting. The ram is moved by a controlling handle, which is connected by a rod to the lever, and may be removed from either side of the bulkhead to which it is fitted. Thus the door may be either opened or closed from either side of the bulkhead. The ram at its lower end runs through a U leather, and the closing main is connected to the space beneath it.

When the officer on the bridge moves over the pedestal handle, and thus opens the operating valve, pressure flows from the pressure mains into the closing mains, and thence to the under side of the ram, which is consequently forced over. The slide-valve thus uncovers the closing port and admits pressure to the closing end of the cylinder. To open a door in such a case, it follows that the pressure on the ram must be relieved. This is accomplished in the following way. Inside the hollow ram is fitted a small miter-valve, which is held on its seat by the pressure in the closing main. A pilot spindle runs through the center of the ram, and terminates at one end against the miter-valve, and at the other against the lever. Suitable packing around the spindle keeps it pressure-tight. When the lever is moved towards the "open" position, it first depresses this spindle, which lifts the small miter-valve off its seat and allows the pressure from the closing main to flow into the tubular ram, past the pilot spindle, which is fluted, and into the exhaust main by suitable ports in the ram and casing. The pressure on its lower end being now relieved, the ram can be operated, as before stated, to open the door. As soon



ARRANGEMENT SHOWING THE SYSTEM OF WATER-TIGHT DOORS FITTED IN THE NEW 25-KNOT TURBINE CUNARDERS LUSITANIA AND MAURITANIA.

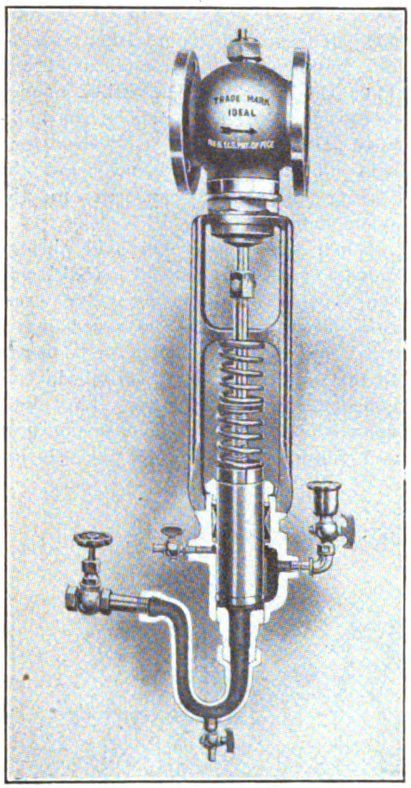


PLATE 2.

as the handle or lever is released, the pressure in the closing main forces the miter-valve on to its seat, and moves the ram back to the "closed" position, and the door is again closed. Thus any man shut in a compartment may escape, and when he has passed through, the door will immediately close behind him. Warning of the closing of the doors is given by bells at each door ringing continuously as the door is moving.

As it is desirable that the officer on the bridge should know the position of each door, whether open or closed, an electric indicator is provided; this contains a fascia plate, on which a plan of the vessel is engraved. Ruby discs are let into the plate at different points, and are numbered to correspond with the doors they represent, and these are automatically lighted when the door is open. Plate 3 is a photo of this indicator.

In addition to the above, automatic bilge float-valves can be fitted in all or any desired water-tight compartment, and will at once come into action upon a rise of water in said compartments due to any cause whatsoever, closing automatically all doors leading from them.

Plate 4 shows a section of the hydraulic cylinder for opening or closing doors. It is needless to point out that this cylinder can be used for actuating either vertical or horizontal doors.

Plate 5 is from a photo of a "cleaving action" bulkhead door, for cutting through coal or other obstructions. The door is especially adapted for water-tight bunkers.

From the foregoing description it will be seen that every requirement of a perfect water-tight door system, as already set forth, is fully covered.

When the safety of passengers is taken into consideration, what surprises the writer is that with such a system available any shipowner should think of building a passenger vessel, and sending her to sea, relying on the old system of closing bulkhead doors.

It is compulsory to provide a full complement of lifeboats and other life-saving appliances, together with davits, which can be relied upon to lower the boats in a heavy sea, with the least chance of mishap. Still, all said and done, provided a vessel is not on fire and can float even with a big hole in her side, she is about the most comfortable and safest place available in mid-Atlantic on a winter night with a high sea running, especially if she has still some motive power left, if only sufficient to keep her up to the wind.

If owners will only give the matter careful consideration, they will find that instead of the fitting of such a device being a serious, unnecessary outlay, it will be a source of positive gain, not only from the fact that the passengers, who value their lives, will from choice travel by vessels so fitted, but also that there should naturally be a considerable saving in the amount debited to insurance account, whether a company insures its own vessels or not.

To show that there are good grounds for these arguments I may mention that the North German Lloyd advertise their vessels as having a water-tight door-closing system, and that the Germanischer Lloyd have already granted a special class in their registry for vessels fitted with such an arrangement.

European owners are rapidly beginning to realize the advantage of the system, not only for Atlantic liners, but for all cross-channel boats carrying passengers, with the results that recent vessels built for both the English and Irish channel service have hydraulic system installed, as also the Ben-My-Chree, the latest addition to the Isle of Man Liverpool service, which has only a three-hour run.

The tendency towards increased speed and the fact that turbine vessels cannot be stopped so quickly as vessels with reciprocating engines (although it may be treason to say so), all point to the importance of rendering passenger vessels as nearly unsinkable as possible.

The inventions which I now propose to consider tend more toward the comfort of passengers than to their safety, and for this reason I shall deal with them much more briefly.

The first of these is the new means of disposing of the ashes and clinkers from the stokeholds of vessels without the necessity of hoisting them above the main deck and dumping them into an ash chute or over the side; or else forcing them above the water line by a jet of water and then over the side through a bent pipe.

The first of these methods is more or less crude, clumsy, and sometimes very noisy and objectionable to passengers, not perhaps so much from the noise of the hoisting appliance as from the expressive mode of speech common to firemen and coal passers, some of whom require to operate the gear on a level with the passenger accommodation.

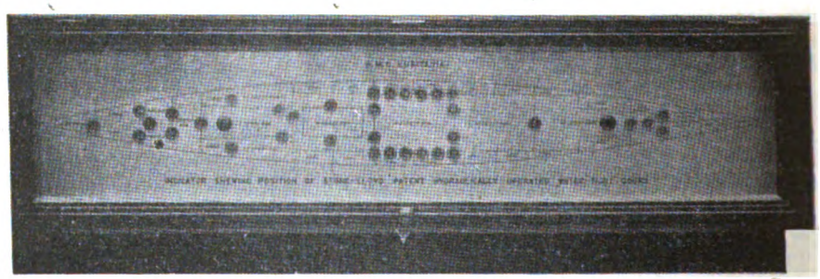
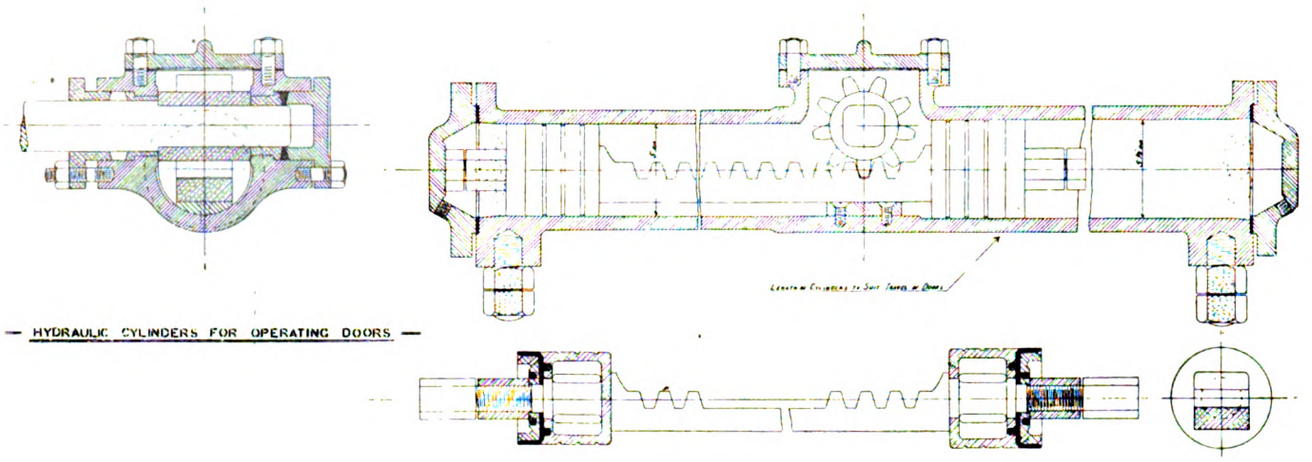


PLATE 3.

The second method is in many respects an improvement on the first. On the other hand, there are, however, some serious objections to its use, not found in the hoisting method. These are, in deep ships such as the Lusitania, the very heavy pumps and high water pressure required to op-



— HYDRAULIC CYLINDERS FOR OPERATING DOORS —

erate the system; the choking of the discharge by a heavy sea, consequent breaking of the jet and flooding the stokehold; the cutting away of the top of the bend due to erosion, requiring its constant renewal; when the bend passes through the 'tween decks, the possibility of injury to cargo through leakage, and last, but not least, the fact that in certain directions of the wind the water and ashes are blown back on the sides and after decks of the vessel, dirtying the former and in the latter case making it most uncomfortable for the passenger. For this last reason, one at least of the large Atlantic lines abandoned the system, going back to the hoist.

The new method consists of an apparatus by which the ashes and clinkers are forced through the bottom of the ship by means of compressed air, and possesses none of the objections inherent to the other methods. Plate 6 is a general arrangement of the ash expeller, as it has been named.

The expeller proper consists of a hopper to receive the ashes and clinkers opening into a crusher, which breaks up the large clinkers. Below the crusher is a drum revolving horizontally in a water-tight casing or barrel very similar to a single ported plug in a large taper cock.

This drum makes about 18 R. P. M. As it revolves the inside of the drum is alternately in communication with the chamber below the crusher, and the discharge opening through the bottom of the ship.

A specially constructed gate valve is fitted immediately below the expeller between same and the cast steel discharge pipe going through the vessel's bottom. This valve is closed when the expeller is not in use; the hopper is also provided with a water-tight door.

About from 50 to 60 cu. ft. of free air compressed to 70 lbs., are required for each expeller. In this special arrangement the air is supplied by a specially constructed steam-driven vertical compressor, having the steam and air cylinder side by side, working on a crank shaft below the cylinders, the steam cylinder being of sufficient diameter to give a surplus of power for driving the expeller, which

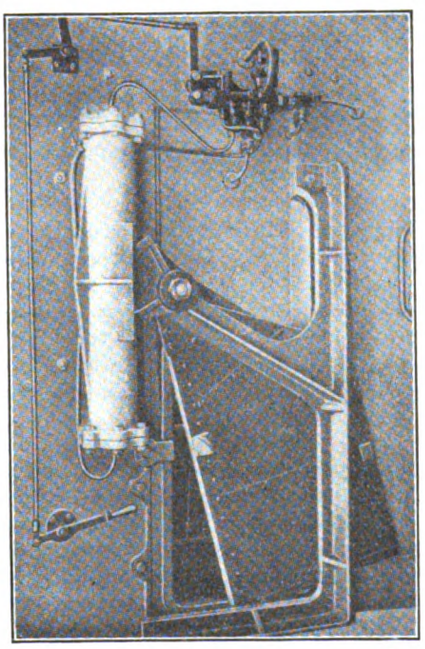


PLATE 5.

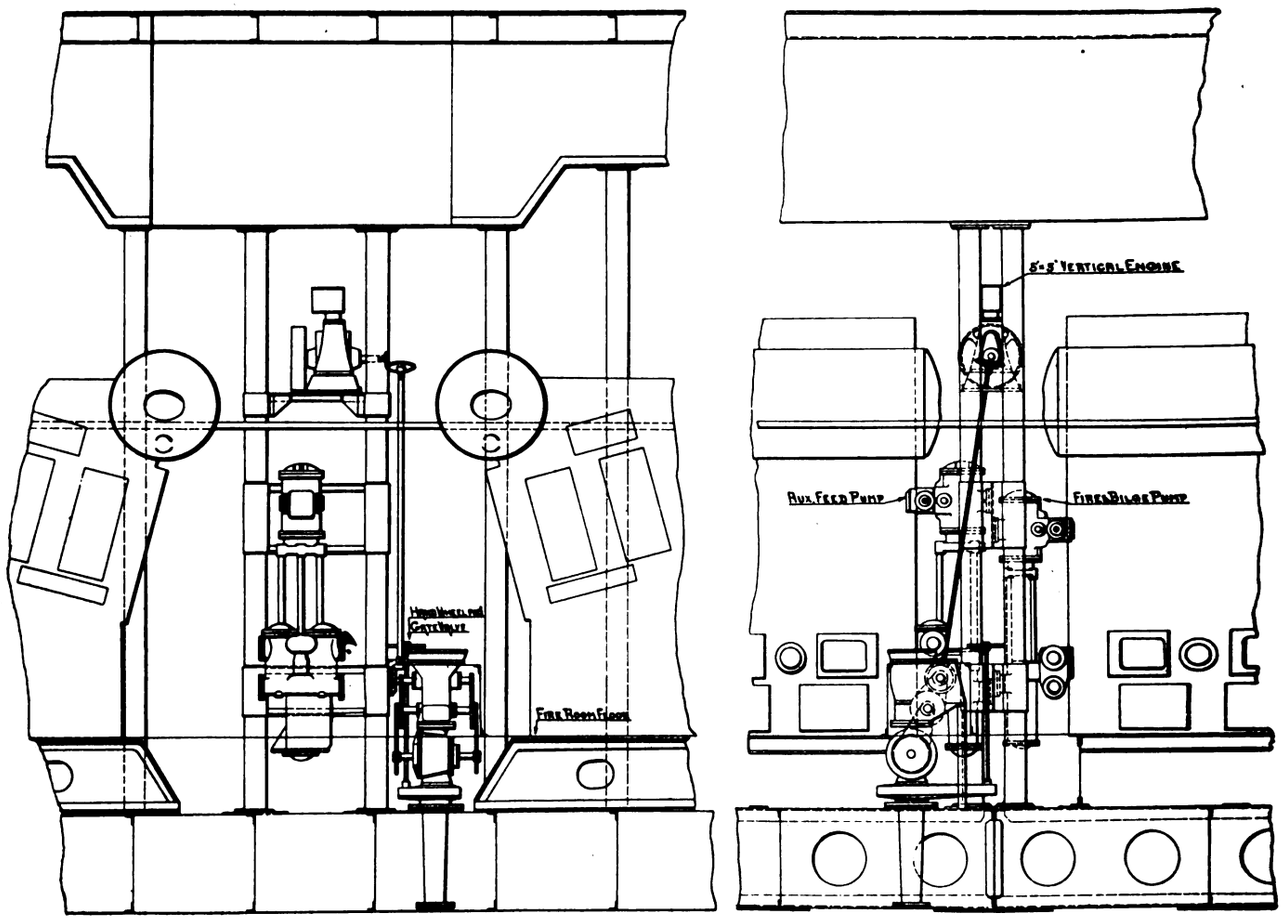
can be done either by chains as shown in arrangement or by shafting and gear. To prevent the chain gear or crusher being smashed by a grate bar getting into the hopper, the first shaft of the machine is driven by means of a safety device consisting of a disc and soft pin, the latter shearing when the stress becomes excessive.

The action of the machine is as follows: The ashes and clinkers on passing through the crusher fall into the chamber immediately over the revolving drum; as the opening in the drum comes round opposite the chamber the ashes and clinker fill the interior of the drum by gravity. As the drum revolves the opening in same moves round to the solid side of the expeller casing or barrel, but before it reaches the discharge opening at the bottom, compressed air is turned on to the interior of the drum, with the result that when the drum and discharge opening come together, the pressure of the air in the drum being much greater than the water pressure, the air suddenly expands, forcing out the water from the discharge pipe and carrying the ashes with it with such force that it is swept completely clear of the bottom of the vessel. Then as the drum continues to revolve, the opening in same is again covered by the solid side of the casing; the compressed air is shut off and the air in the drum allowed to escape, so that when the opening again comes round to the chamber below the crusher, the drum is ready to receive a fresh charge.

The capacity of the machine as now made is from 8 to 10 tons per hour, sufficient to handle, in half an hour each watch, the ashes and clinkers from 48 furnaces, burning under forced draft.

The advantage of this method of discharging ashes as against all others is so marked that in the opinion of the writer it leaves no room for discussion. There is no dirt, noise, danger of leaking joints or damage either to cargo or passengers' feelings, and the only question which might be raised by an expert is what effect the ashes might have on the bottom of the ship, the stern bearings or the injection inlets.

In this respect actual experience



ARRANGEMENT SHOWING ASH EXPELLER DRIVEN BY GEARING, COMPRESSOR NOT BEING SHOWN, AS SAME CAN BE PLACED WHERE MOST CONVENIENT.

has fully disposed of the matter in the most satisfactory way, as the following extract from a letter written by the superintendent engineer of the Van de Stoomvaart-Maatschappij, Nederland, to the makers will testify: "Upon the arrival of the ship at Amsterdam she was placed in dry dock and her bottom was carefully examined with the view to ascertaining whether any scoring had taken place owing to the expulsion of ashes beneath the water line. I have to inform you, however, that no marks whatever were to be observed, neither has there been any trouble with the suction, nor with the propellers or propeller shaft."

In addition to this the chief engineer of the Nieuw Amsterdam assured the writer that when this vessel was docked after the expeller had been in use for over six months he carefuly examined the bottom, but could find no sign of erosion, pitting or scouring, with the exception that a little paint about the size of his hand had been rubbed off the plates immediately in the way of the ash discharge pipe. Had a ring been fitted round this opening the bottom would have been untouched. No signs of ashes were found in the inlets or stern tube bearings. This proves conclusively that the force of the compressed air does carry the ashes completely clear of the bottom of the vessel, as already stated.

Plate 7 shows the arrangement of the expeller as same will be installed in the stokeholds of the new battleship North Dakota. In this case compressed air is supplied by a Westinghouse compound compressor, the expeller being driven by an ordinary, small, vertical engine.

There will be four expellers in all in the above vessel and a similar number in her sister, the United States battleship Delaware.

The appliance has also been adopted by the British navy, and is being fitted in the three new battleships now building of the St. Vincent class.

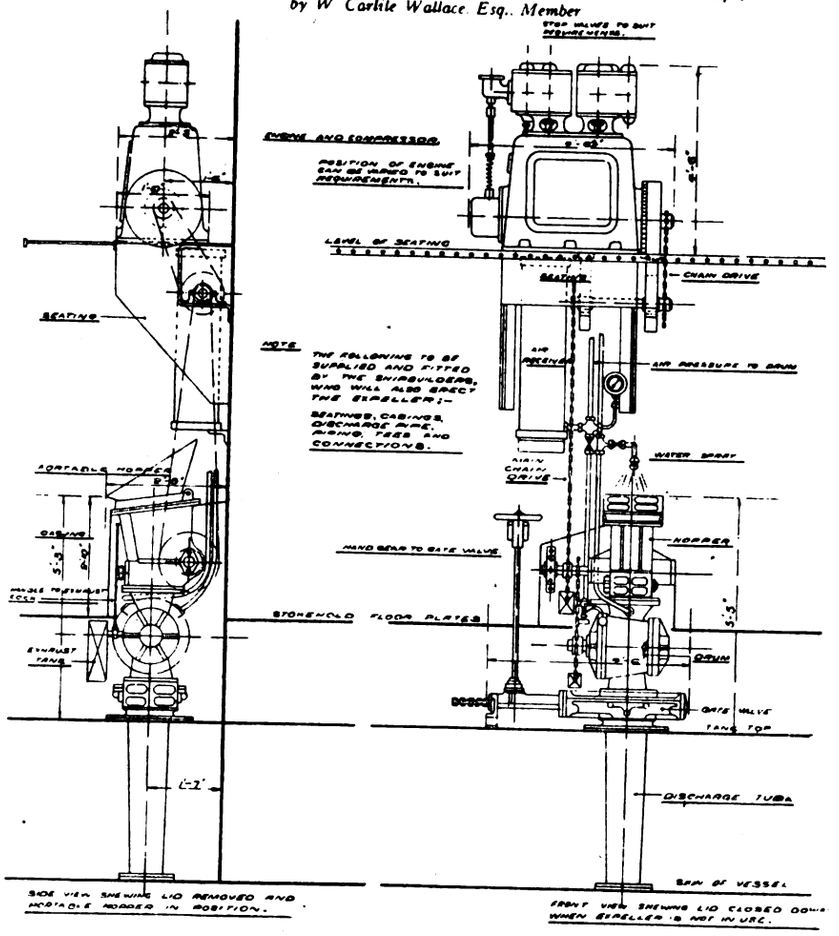
The expeller possesses a special advantage in the case of war vessels, the importance of which can hardly be estimated. It leaves no trace behind it, whereas, if ashes are dumped over the side in calm weather, it shows on the surface 12 hours afterwards.

There are just two more very recent inventions to which I would like to make hurried reference.

The first of these is a device for cooling state rooms in vessels trading in the tropics and fitted with refrigerating machinery. The second has for its object the maintaining of electrically heated state rooms at a definite temperature irrespective of atmospheric conditions.

The cooling device consists of a pipe about 8 in. in diameter and 5 ft. long. The lower end of this pipe has oblong openings about 4 in. deep, so arranged round the bottom as to form a grid for admission of air; inside the pipe is a brine coil supplied from the refrigerator, and on top of the pipe is a small centrifugal fan driven by a little motor placed on a bracket to one side of the pipe and discharging into the state room. On starting the fan the air is drawn in through the openings at the bottom of the pipe over the brine coil and through the fan back into the room at a considerable reduced temperature. By this means the state room

To illustrate paper on "Recent Inventions as Applied to Modern Steamships," by W Carlile Wallace Esq., Member



GENERAL ARRANGEMENT OF ASH EXPELLER.

can be kept comfortable, even in the most sweltering weather, partly due to cooling, but mainly due to the decreased relative humidity.

The use of electricity as a heating medium in the first class state rooms of ocean liners has largely increased in the last few years, owing to the fact that it is by far the cleanest and most easily fitted of any system, doing away with all steam pipes, valves and other objectionable fittings. On the other hand it possesses one serious drawback, and that is its cost. The cost of electrical heating may be set down at from 10 to 12 times greater than steam heating.

For this reason, an instrument which will control and prevent the waste of electric energy when used for heating must be of considerable value. This is the function of the Geissinger electric thermostat, and although sensitive in the highest degree, it is absolutely unaffected by vibration due to the principle involved in its design, which is entirely different from the ordinary electric thermostat, which latter instrument is so sensitive to vibration that when nearing the critical temperature the tremor in a city building due to the traffic is sufficient to destroy the contacts and burn out the switches in a few days. It is therefore needless to say that it would be quite useless on board ship.

To maintain a temperature of 70° Fahr. in an ordinary outside state room on an Atlantic liner during the coldest weather encountered on the northern track, it is necessary to supply a 1,200-watt heater, which heater is much too large during nine-tenths of the time during which artificial heat is desirable.

Careful tests on the Oceanic have shown that when the regulation of the temperature is left to the passengers themselves, the current used varies but little whether the atmospheric temperature during the voyage has been above or below the average, and is in all cases higher than ought to have been necessary to maintain the rooms at a reasonable temperature, showing very conclusively that the heaters are switched on at the beginning of the voyage and left on, the temperature being regulated by opening the doors or side light if admissible, so allowing the heat to escape.

On the other hand, if the heaters are automatically controlled by a thermostat, the moment the room reaches a given temperature the heater is switched off and remains off till the temperature has dropped not exceeding 2°, when it is again switched on, maintaining an equitable temperature in the room and effecting thereby a saving of about 50 per cent in heating current.

DISCUSSION.

Mr. H. M. Pleason: I want to make a remark or two in reference to the author's statement on the bottom of page 2. He says that electricity has been used with considerable success in this country in the operation of water-tight doors, but he relegates it to a second place on account of the many objections to the use of electricity which appear to him. I think you will all agree there are defects in almost any system that can be devised, and especially are there some defects in the hydraulic service. For instance, the pressure at which the system is operated is 700 pounds. That high pressure is hard to confine, and considerable trouble is had with the water cutting the valves. It was very difficult to keep the valves tight, and I do not think it is quite fair to the electrical systems of operating water-tight doors to give it such a black eye, because other systems have the same objections.

There is another remark there in that connection, which was about to escape me. Of course, it is a good thing in any system to have two ways of doing it. If the hydraulic system is so sure as the advocates of it claim, why is it that they have an auxiliary means of operating it by steam, which the hydraulic system has,—they have an auxiliary to be operated by steam in case the hydraulic fails. That would hardly indicate that they feel so sure of the hydraulic operation.

Mr. William J. Baxter: I would like to know what objection the author has to following the practice on the Mauretania and Lusitania, of heating and cooling the air before it is forced into the—

The Vice President: Are there any other questions or remarks on this subject?

Mr. James W. Kellogg: I went over one of the ships of the United Fruit Co., where this system was in-

stalled, and it seems that the trouble they experience there is that the people will not go into the rooms and have the doors and windows closed. They want the air. If they open their windows and then leave the stateroom, the cooling effect of the refrigerating pipe is ineffective. You could not put enough cool coils into the ship to have any effect in a warm climate under those conditions.

It seems to me that the idea back of Mr. Baxter's inquiry will be the one which will be adopted eventually, which will lead to the air being supplied pure and at a proper temperature, and then people would depend upon it. As the system is referred to in this paper, they are simply using the air over and over again, and I do not think it is possible to educate the public to the point of view where they will be willing to have only the requisite amount of air coming in to keep the air cool and fresh. I had an idea some years ago that the electric system was quite as reliable as any other, and one of the men who took the other view was Mr. Coles of the company—he was devoting his time to the hydraulic system. He thought the electric gauze would never come into use, but I believe he has since come around to the view that electric gauze will take first place, and not be relegated to second place, or third place. From my experience generally, I think the electric apparatus, when the people who design it are cognizant of what it has to do and the conditions on these strips, will be made as reliable as any other form.

Mr. L. H. Chandler: I am familiar with the electric system on board the United States steamship Connecticut, and was in charge of the actual operation of the installation for a year. The regular routine at sea is that every evening the doors are closed by electricity from the bridge, and on one occasion we closed them for business when the ship touched bottom, and I should say our experience was that 99 times out of 100 everything closed very satisfactorily. We would sometimes have a failure to close reported back by the automatic dial signal that shows what has happened, but in almost every case where we investigated that, it was found that the door had actually closed and the fault was in the recording system and not in the operation of the doors.

I think the general field of service is very favorable to the electrical apparatus as we now have it installed. It is considered very satisfactory and very reliable. The older hydraulic apparatus that we had—I do not know that this criticism applies to the more modern apparatus—with the older hydraulic apparatus all the doors used to close very much the same way, in the way that the knife of the guillotine came down, and the ordinary fireman used to get a chunk of wood and put it under it when he went into the bunker, as he did not like to pass through the door. But I fancy, in the modern hydraulic system, that has been modified and overcome. We are much pleased with the electric, as we have had it, and are well satisfied with it.

Mr. W. F. Forbes: Is there not a law which forbids the ejection of acids under the water line in most harbors.

The Vice President: I understand there is in New York harbor.

Any further remarks on the paper before us? If not, it is in order for the author to make his closure.

Mr. W. Carlile Wallace: As to the first point with regard to electricity, as I stated, I understand it has been very satisfactorily used in this country, especially, I think, in the naval vessels, but the hydraulic system now is on a very large number of vessels of the merchant service where possibly they are subject to even less care than what they would be in the navy, and so far as I know there has never been a failure of a proper closing of the doors in a properly arranged system. The doors do not come down, as the last speaker mentioned, like the guillotine—in fact, that is one of the main points, that the doors must close slowly and steadily.

I think the gentleman who spoke about steam being applied for the closing of the doors is under some misapprehension, that is not the case in the Mauretania or Lusitania, which are fitted with this system. There is a hand gear applied for closing the doors, if the hydraulic pressure is not on. That is essential.

With regard to Mr. Baxter's remarks as to the heating of vessels by indirect system, forcing air into the rooms, this works very well in the larger rooms, but it has been found almost impossible in the smaller staterooms of vessels to get all the outside rooms and inside rooms on separate thermo-tanks. The result has been that if you raise the temperature of your entering air sufficiently to keep your outside rooms at a proper temperature, inside rooms are insufferably hot, because, of course, they have a certain amount of internal heat from the boilers radiated up from the engine spaces and boilers, and last winter you could see in any of the staterooms that in the inside rooms they had fans for cooling the passengers, whereas in the outside staterooms they had auxiliary electric heaters to raise the temperature to a proper degree.

In my belief the proper system to adopt is to force fresh air all over your ship, and keep the air at such a temperature, preferably by means of a thermostat, so that it keeps the inside portions of the ship at the right temperature, the outside rooms being heated in addition by electric heaters, these heaters being under thermostat control. By this arrangement you get absolutely perfect and equable temperature over the whole vessel.

There is another point that those who go down into the sea in ships will find out, and that is this, in crossing the Atlantic you get two classes of passengers, particularly the men, Americans and Englishmen. An Englishman likes the temperature of his room to be about 55 to 60 degrees, and the American likes the temperature of his room to be from 65 to 70 degrees, and it is impossible to please all these people, if you are forcing the air in from the outside at a given temperature; whereas, if you have a thermo-static control, you have only to alter the thermostat to suit each individual case, and everybody is pleased.

There is one other point, which Mr. Forbes raised, and that was that it was contrary to the harbor regulations to discharge acids into the harbor. I think that is the case in every harbor. Because you have an ash ejector, you do not necessarily discharge the ashes when you are in the harbor,—of course, you could do it, and perhaps not be found out.

Senator Lodge's bill to regulate steerage accommodations on ocean steamers, which has been agreed on in conference, increases the statutory requirements for the comfort of steerage passengers. It requires at least 5 sq. ft. on the open deck for each steerage passenger, a provision new to American law but adopted in England last year. It seeks also to encourage dining, smoking and recreation rooms exclusively for steerage passengers. It sets apart not less than 14 sq. ft. for the sleeping accommodations of each steerage passenger. Obviously the bill reduces the number of steerage passengers that a steamer can legally carry.

WAR ON THE SHIPWORM.

Considering the millions of dollars' worth of damage annually done by the "shipworm," it is surprising that nothing very definite has been known about the animal up to now. It is not a worm at all, of course, but a bivalve mollusc, which devours piles and all sorts of structures of wood in water. It first attracted serious attention in the eighteenth century, on account of the injury it did to the dikes of Holland.

Charles P. Sigerfoos, professor of biology, university of Minnesota, who has made a special investigation of the subject, raising shipworms in aquaria and otherwise studying them, reports to the United States fisheries bureau that sometimes these worm-like molluscs attain a length of 4 ft. or even more, with a diameter of an inch. Such a "worm" will lay as many as 100,000,000 eggs in a season—a fact which is calculated to discourage any attempt to exterminate the animal.

In the course of his studies Professor Sigerfoos hung boxes and other wooden things in sea water, and soon found large numbers of infant shipworms creeping over them. At this stage of their being they somewhat resemble tiny clams. Later, they begin to burrow in the wood, using for the purpose the front edges of their bivalve shells, on which teeth develop.

The eggs laid by the female are thrown into the water, and are almost immediately hatched, whereupon the young ones swim about for a while—that is to say, for perhaps a month—during which they lead a life, the details of which are as yet unknown. At the end of that time they seek wood, wherever it may happen to be found, and proceed to burrow into it. Within two weeks after settling down they increase hundreds of times in size, and in four weeks they are ready to breed.

Thus it will be seen that the history of the shipworm is extremely simple. As it bores its way through a pile or other wooden object it chews up the material, so to speak, and swallows it in fine particles. When, as so commonly happens, many millions of the creatures attack a dock, or other structure under water, its destruction is a matter of only a comparatively short time. Hence the desirableness of finding a substance for use as a coating which shipworms cannot eat.—*Saturday Evening Post.*

ITEMS OF GENERAL INTEREST.

The Cherry Chemical Co., manufacturer of Red Seal boiler compounds, advise us that they have removed from No. 10 North Nineteenth street to a larger building at No. 1018 Callowhill street, Philadelphia.

The government is building a transport pier at Fort Mason, San Francisco, contract having recently been awarded to the California Dredge Construction Co. at San Francisco at $1,182,200. When completed the pier will have a capacity for docking five transports at one time.

Senator Flint, of California, has been unsuccessful in his effort on behalf of his constituents of having either the whole or a part of the Atlantic battleship kept in Pacific waters. President Roosevelt told Mr. Flint that he did not feel that there was any reason for diverting the fleet from its course around the world.

McLean, Kennedy & Co., Quebec, advises us that the steamer Malin Head which was sunk in collision by the Californian in St. Lawrence river was not raised by the London Salvage Association as stated in the MARINE REVIEW of Nov. 26, but was raised by Messrs. G. Davie & Sons, Quebec, under contract with the owners of the steamer. The operations were conducted under the control of George Davie.

The Caledon Ship Building Co., Dundee, recently launched the twin-screw yacht Triad for G. A. Schenley, of Southampton. The Triad is 264 ft. over all, 35 ft. beam and 19 ft. depth molded. She is rigged as a two masted fore and aft schooner having two funnels. Her machinery will consist of two sets of triple-expansion engines, 20, 32½ and 52½ in. cylinder diameters by stroke of 36 in.

The navy department has ordered surveys for general repairs to the Tallahassee and Arkansas, which are to be thoroughly fitted out for service with the naval academy squadron to which they are attached. The damage done to the Tallahassee by gunshot and torpedo tests last summer has been entirely repaired. A general survey has also been recommended for the Rogers, including a recommendation for new boilers.

The battleship Maine recently sailed from New York for Hampton Roads where the fleet which is to take part in the inauguration of President Gomez at Havana, on Jan. 23, is to rendezvous. It is understood that the Maine will be the flagship of this special squadron, which will likely include the battleships Idaho, Mississippi and New Hampshire, the armored cruisers Montana and North Carolina, and the scout cruisers Chester, Birmingham and Salem. This fleet, after participating in the ceremonies at Havana, is to meet the homecoming Atlantic battleship fleet and escort it to Hampton Roads.

Permission has been granted by the secretary of war to the Northern Pacific railway to keep the draw of its Minnesota street bridge at Superior closed for the remainder of the season. The span was closed on Nov. 1.

The bureau of yards and docks, navy department, is asking for proposals for the construction of a concrete and granite dry dock, 1,140 ft. long, 130 ft. wide and 35 ft. deep, at the naval station, Pearl Harbor, Hawaii.

The United States Naval Academy Alumni Association of the Middle West held its banquet at the Congress Hotel, Chicago, Nov. 23. The guests of honor were: Chief Instructor Capps, Admirals Brownson, Chadwick, Dayton, Ross and Higginson. Chief Constructor Capps read letters from Admiral Dewey, Admiral Schley, and Admiral Evans defending the battleships of American design, saying that they believed them to be equal to any. Officers were elected as follows: President, George A. Sanderson; vice president, Charles Deering; secretary and treasurer, W. J. Wilson.

The Hamburg-American liner Amerika, on her last trip to New York, carried the largest quota of immigrants leaving Europe on any one ship in over a year, having had 1,984 passengers in her steerage. The next largest number for this year was carried by the Kaiserin Auguste Victoria, of the same line, which arrived in this country on Dec. 8 with 1,545 steerage passengers. The Amerika, in addition to her record number of steerage passengers, also had the largest total passenger list for the year, carrying 270 in the first cabin, and 211 in the second cabin, a total, with the steerage, of 2,465.

The Board of Port Commissioners of the city of New Orleans has practically completed arrangements for the sale of the $3,500,000 bond issue for the extension and completion of the public wharf system. Accordingly the board has authorized the construction of steel sheds and 200-ft. wharves above and below Canal street for a total length, with the exception of one break, of more than seven city blocks. In addition to this there is to be a new 2,000-ft. wharf covered by a steel shed 200 ft. wide built at Washington avenue.

RECEPTION TO SECRETARY NEWBERRY.

Truman H. Newberry, secretary of the navy, at a reception in his honor at the Detroit Club on Christmas Day told of some plans to eliminate red tape from the navy department and to reduce its operations to a business basis. He denied posing as a reformer, however. "I'm simply taking the machinery, oiling it where necessary; if I find an unnecessary part, casting it aside and reducing the whole machine to the best working order within my power. What I intend to do is to increase the membership of the general board and the board of construction in order to get a greater cooperation between the two. To accomplish that I have amended the naval regulations so as to distribute the work of battleship designing in such a way as to avoid the archaic and unbusinesslike methods which have prevailed in the past.

"In a way, I am conceding to many critics of the bureau administration of the department who have alleged that under the system it is almost impossible to induce any board or bureau to admit existing defects. For example, I wish to amalgamate the bureau of steam engineering with the board of construction and repair under one head. Heretofore the board has been limited to the designing and construction of new vessels. In the future it shall perform any duties I assign to it."

Mr. Newberry's plan of reorganization does not alone rest with heads of the department, but affects all branches of the service.

DEFENSE OF OLONGAPO.

Washington, Dec. 26—The naval authorities at the base and dock yard at Olongapo have submitted a long report concerning the method of transient as distinguished from permanent defense of that place. This is in anticipation of the development of the station, now that the policy of the administration showing preference for Olongapo as against Cavite has been approved by congress. The army is making rapid progress with the defensive works. Some of the armament has been shipped, and it is expected that the project will be well on toward completion by the time the chief of coast artillery, Gen. Arthur Murray, visits the place on his contemplated tour of inspection, on which he starts from New York on Feb. 15. The naval program of defense relates to the use of submarines, surface torpedo boats and motor boats. With Olongapo becoming the largest and most important American naval base abroad, it is appreciated that it will be the object of attack in the event of war. It is also realized by the experts that it may be possible for swift boats, especially of the submarine type, to elude the coast defenses, and it is foreseen that there should be an approved scheme of defending the floating dry dock and the shops on shore with some mobile type of naval defense. One of the propositions which was made some time ago suggested the use of a huge steel net which should be extended around the dry dock in time of war, and should otherwise be employed in frustrating attack, especially of a submarine character. The civil engineers of the navy have been examining this feature, and have reported to the department that the expense of such a neet would be considerable, while there is grave doubt whether it would be entirely effective, especially as the dock itself possesses a certain factor of self-defense in being made up of compartments, only one of which would be damaged by a well directed torpedo attack. The dock would not be destroyed, or even placed out of commission, in all probability, by torpedo attack, and it is represented that a flotilla of torpedo boats, surface and submarine, would answer all the purposes of patrol and form a valuable auxiliary to the heavy fortifications on land.

HAS CIRCLED THE GLOBE.

Miss Gladys Margaret Graham, the 15 year old daughter of Capt. and Mrs. R. J. Graham, of the American ship Erskine M. Phelps, now loading in Seattle holds the world's record for a girl of her age for travel by water.

Although Miss Graham has been attending school in Honolulu for the past three years, the first twelve years of her life were spent at sea. In that time she has sailed with her father more than 300,000 miles under the American flag. Three times has this girl encircled the world in sailing ships, three times rounded Cape of Good Hope and 17 times rounded Cape Horn. She has crossed the equator 40 times. She is about to add another 17,000 miles to her sailing record, for when the Phelps sails from Puget Sound for the Atlantic coast in the near future she will again accompany her parents around Cape Horn. She then plans to resume her studies in an eastern school.

BIDS FOR FURNISHING BUOYS.

Bids opened by the lighthouse inspector at Tompkinsville, N. Y., for furnishing buoys and appendages for the lighthouse establishment during the fiscal year ended June 30, 1909, included the following:

BELL BUOYS.

*P. Delaney & Co., Newburgh, N. Y.	$12,765.00
Franklin Machine & Steam Boiler Works, Brooklyn, N. Y.	13,110.00
Union Boiler Mfg. Co., Lebanon, Pa.	14,250.00
Canton Boiler & Engineering Co., Canton, O.	15,522.00

*Accepted.

WHISTLING BUOYS.

*Canton Boiler & Engineering Co., Canton, O.	$ 5,783.84
Franklin Machine & Boiler Works, Brooklyn, N. Y.	7,654.40
P. Delaney & Co., Newburgh, N. Y.	8,784.00

*Accepted.

GAS BUOYS.

Union Boiler Mfg. Co., Lebanon, Pa.	$ 8,960.00
*American Welding Co., Carbondale, Pa.	9,450.00

*Rejected.

CAN AND NUN BUOYS.

*Canton Boiler & Engineering Co., Canton, O.	$10,376.07
Franklin Machine & Boiler Works, Brooklyn, N. Y.	10,488.40
Christian N. Seidle, Lebanon, Pa.	11,477.01
P. Delaney & Co., Newburgh, N. Y.	14,453.00

*Accepted.

SPAR BUOYS.

*Jordan Bros. Lumber Co., Norfolk, Va.	$ 4,280.00
John W. C. West, Portsmouth, Va.	4,320.00
Charles R. Johnson, Norfolk, Va.	5,850.00
Williams & Spence, South Mills, S. C.	6,930.00

*Accepted.

TALL TYPE BUOYS.

*Canton Boiler & Engineering Co., Canton, O.	$ 4,464.29
Franklin Machine & Steam Boiler Works, Brooklyn, N. Y.	4,645.83
Christian N. Seidle, Lebanon, Pa.	4,927.62
Union Boiler & Mfg. Co., Lebanon, Pa.	5,005.00
P. Delaney & Co., Newburgh, N. Y.	6,050.00

*Accepted.

BIDS FOR FURNISHING BARGES.

Bids opened Nov. 27 by the purchasing agent of the Isthmian Canal Commission at Washington, D. C., for furnishing four steel dump barges, were as follows:

Atlantic Equipment Co., 30 Church St., New York	$125,500
William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.	71,600
John H. Dialogue & Sons, Camden, N. J.	96,000
Fore River Ship Building Co., Quincy, Mass.	96,000
Maryland Steel Co., Sparrows Point, Md.	106,660
Newport News Ship Building & Dry Dock Co., Newport News, Va.	109,500
Pusey & Jones Co., Wilmington, Del.	110,000

BIDS FOR BUILDING WHARF.

Bids opened by the lighthouse engineer at Baltimore, Md., for the construction of a wharf for lighthouse purposes at Washington, D. C., were as follows:

*Thomas Banks, Washington, D. C.	$ 6,798.26
W. L. Miller, Boston, Mass.	8,545.69
Penn Bridge Co., Beaver Falls, Pa.	8,994.00
Carter & Clark, Washington, D. C.	9,438.96
Atlantic Dredging Co., Philadelphia, Pa.	9,850.00
V. H. Virden, Lewes, Del.	9,450.00
Richard Parrott, Newburgh, N. Y.	10,840.00
Lyons Bros., Brookland, D. C.	11,400.00

*Accepted.

An 18,000-ton German battleship was launched at Kiel on Dec. 13. She was christened Posen, although she had previously been known as the Baden.

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The Star indicates alternate insertions, the Dagger once a month.

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U. S. Engineer Office, Detroit, Mich., Dec. 21, 1908. Sealed proposals for building and furnishing wooden tug will be received at this office until 3 P. M., Jan. 21, 1909, and then publicly opened. Information on application. C. McD. Townsend, Lieut. Col., Engrs.

TUG ARTHUR JONES FOR Sale, 16 x 18, 140 pounds steam, hull recently rebuilt and all in good working order. E. M. Graves, 17 Commercial Bank Bldg., Cleveland, O.

A WOODEN BARGE WANTED, sound and in good condition, suitable for cattle lighter in Montreal Harbor, size about 40 ft. beam by 180 ft. length. Address J. R. Ironside, Montreal, Que.

FOR SALE. ONE ROBERT WATER Tube Boiler No. 9, repiped last spring. One F. & A. compound marine engine, 6 x 12 x 6. Built by the Marine Iron Works, Chicago, Ill. One Worthington Duplex Air Pump, 4½ x 3¾ x 4. One Worthington Duplex Boiler Feed Pump 3 x 1¾ x 3. Outfit practically as good as new and will be sold cheap. Address H. B. Larsen, Manistee, Mich.

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Sullivan, M., Buffalo, N. Y.

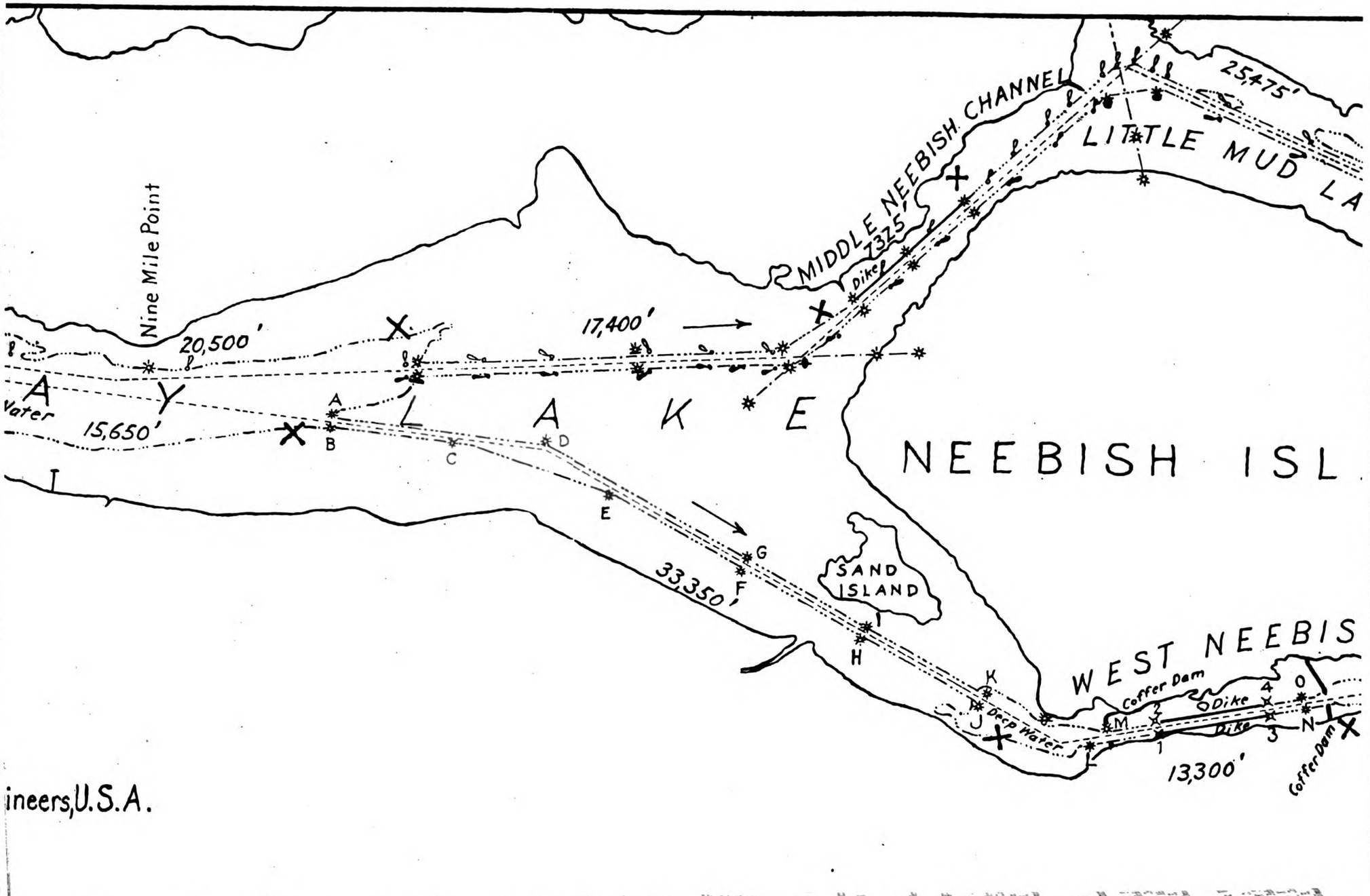
CONTRACTORS. (Pile Driving and Submarine.)

Buffalo Dredging Co., Buffalo, N. Y.
Dunbar & Sullivan Dredging Co., Buffalo, N. Y.
Great Lakes Dredge & Dock Co., Chicago, Ill.
Parker Bros. Co., Ltd., Detroit, Mich.
Starke Dredge & Dock Co., C. H., Milwaukee, Wis.
Sullivan, M., Buffalo, N. Y.

CONTRACTORS (Public Work).

Breymann Bros., G. H., Toledo, O.
Buffalo Dredging Co., Buffalo, N. Y.
Dunbar & Sullivan Dredging Co., Buffalo, N. Y.
Griscom-Spencer Co., New York, N. Y.
Great Lakes Dredge & Dock Co., Chicago, Ill.
Starke Dredge & Dock Co., C. H., Milwaukee, Wis.
Sullivan, M., Buffalo, N. Y.

Vest Neebish Channel issued by the Lake Carriers' Association for the use of its Masters and l



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Buyers' Directory of the Marine Trade---*Continued.*

CONVEYORS (Chain).

Brown Hoisting Machinery Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CORDAGE.

Baker & Co., H. H., Buffalo, N. Y.
Columbian Rope Co., Auburn, N. Y.
Great Lakes Supply Co., Buffalo, N. Y., and Duluth, Minn.
Upson-Walton Co., Cleveland, O.

CRANES.

Brown Hoisting Machinery Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CRANES (Dock).

Brown Hoisting Machinery Co., Cleveland, O.

CRANES (Electric Traveling).

Brown Hoisting Machinery Co., Cleveland, O.
C. & C. Electric Co., New York, N. Y.

CRANES (Gantry).

Brown Hoisting Machinery Co., Cleveland, O.

CRANES (Hand Traveling).

Brown Hoisting Machinery Co., Cleveland, O.

CRANES (Locomotive).

Brown Hoisting Machinery Co., Cleveland, O.

CRANES (Pneumatic).

Brown Hoisting Machinery Co., Cleveland, O.

CUPS (Oil and Grease)

Cook's Sons, Adam, New York, N. Y.
Michigan Lubricator Co., Detroit, Mich.
Penberthy Injector Co., Detroit, Mich.

DAVITS.

Lundin, A. P., New York, N. Y.

DERRICKS.

Dake Engine Co., Grand Haven, Mich.

DESIGNERS (Ship).

Babcock & Penton, Cleveland, O.
Ekstrom, G., Detroit, Mich.
Kidd, Joseph, Duluth, Minn.
Nacey & Hynd, Cleveland, O.
Wilby, Carlton, Detroit, Mich.
Wood, W. J., Chicago, Ill.

DIVERS.

Donnelly Salvage & Wrecking Co., Ltd., Kingston, Ont.

DIVING APPARATUS.

Morse, A. J., & Son, Boston, Mass.
Schrader's Son, Inc., A., New York, N. Y.

DRAFT (Artificial for Boilers)

American Ship Building Co., Cleveland, O.
Detroit Ship Building Co., Detroit, Mich.
Great Lakes Engineering Works, Detroit, Mich.

DRAFT (Mechanical for Boilers).

American Ship Building Co., Cleveland, O.
Detroit Ship Building Co., Detroit, Mich.
Great Lakes Engineering Works, Detroit, Mich.

DOCKS (Dry).

American Ship Building Co., Cleveland, O.
Atlantic Works, East Boston, Mass.
Buffalo Dry Dock Co., Buffalo, N. Y.
Chicago Ship Building Co., Chicago, Ill.
Cramp, Wm., & Sons, Philadelphia, Pa.
Detroit Ship Building Co., Detroit, Mich.
Great Lakes Engineering Works, Detroit, Mich.
Manitowoc Dry Dock Co., Manitowoc, Wis.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Newport News Ship Building Co., Newport News, Va.
Superior Ship Building Co., Superior, Wis.
Tietjen & Lang Dry Dock Co., Hoboken, N. J.
Toledo Ship Building Co., Toledo, O.

DYNAMOS.

C. & C. Electric Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.

EJECTORS.

Penberthy Ejector Co., Detroit, Mich.

EJECTORS (Ash).

Great Lakes Engineering Works, Detroit, Mich.

ENGINES (Deck).

Chase Machine Co., Cleveland, O.

ENGINES (Hoisting).

Chase Machine Co., Cleveland, O.
Marine Iron Co., Bay City, Mich.

ENGINES (Marine).

American Ship Building Co., Cleveland, O.
Atlantic Works, East Boston, Mass.
Briggs, Marvin, New York, N. Y.
Chicago Ship Building Co., Chicago, Ill.
Chase Machine Co., Cleveland, O.
Collingwood Ship Building Co., Collingwood, Ont.
Cramp, Wm., & Sons, Philadelphia, Pa.
Detroit Ship Building Co., Detroit, Mich.
Fletcher, W. & A., Co., Hoboken, N. J.
Fore River Ship Building Co., Quincy, Mass.
Gillett & Eaton, Lake City, Minn.
Great Lakes Engineering Works, Detroit, Mich.
Griscom-Spencer Co., New York, N. Y.
Johnston Bros., Ferrysburg, Mich.
Manistee Iron Works Co., Manistee, Mich.
Manitowoc Dry Dock Co., Manitowoc, Wis.
Maryland Steel Co., Sparrow's Point, Md.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Newport News Ship Building Co., Newport News, Va.
New York Ship Building Co., Camden, N. J.
Quintard Iron Works Co., New York, N. Y.
Sheriffs Mfg. Co., Milwaukee, Wis.
Superior Ship Building Co., Superior, Wis.
Toledo Ship Building Co., Toledo, O.
Trout. H. G., Buffalo, N. Y.
Truscott Boat Mfg. Co., St. Joseph, Mich.

ENGINES (Mooring).

Chase Machine Co., Cleveland, O.

ENGINEERS.

(Marine, Mechanical and Consulting.)

Babcock & Penton, Cleveland, O.
Ekstrom, G., Detroit, Mich.
Furstenau, M. C., Philadelphia, Pa.
Linch, Chas. S., N. A. & M. E., Philadelphia, Pa.
Nacey & Hynd, Cleveland, O.
Hunt, Robt. W., & Co., Chicago, Ill.
Kidd, Joseph, Duluth, Minn.
Nacey, James, Cleveland, O.
Roelker, H. B., New York, N. Y.
Root, W. O., Chicago, Ill.
Wilby, Carlton, Detroit, Mich.
Wood, W. J., Chicago, Ill.

FASTENERS (Hatch).

Lundin, A. P., New York, N. Y.
Peckham, Orten P., River Rouge, Mich.

FILTERS (Feed Water).

Ross Valve Mfg. Co., Troy, N. Y.

FIXTURES.

(Lamp, Oil and Electric.)

General Electric Co., Schenectady, N. Y.

FORGING.

(Crank, Propeller or Thrust.)

American Manganese Bronze Co., New York, N. Y.
Cleveland City Forge & Iron Co., Cleveland, O.
Fore River Ship Building Co., Quincy, Mass.

FUELING COMPANIES AND COAL DEALERS.

Hanna & Co., M. A., Cleveland, O.
Parker Bros. Co., Ltd., Detroit, Mich.
Pickands, Mather & Co., Cleveland, O.
Pittsburg Coal Co., Cleveland, O.
Smith & Co., Stanley B., Detroit, Mich.
Toledo Fuel Co., Toledo, O.

FURNACES (for Boilers).

Continental Iron Works, New York, N. Y.
Willoughby, A. B., The Bourse, Philadelphia, Pa.

GAGES (Water).

Penberthy Injector Co., Detroit, Mich.

GEARS (Steam Steering).

American Ship Building Co., Cleveland, O.
American Ship Windlass Co., Providence, R. I.
Chase Machine Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Detroit Ship Building Co., Detroit, Mich.
Hyde Windlass Co., Bath, Me.
Sheriffs Mfg. Co., Milwaukee, Wis.

GENERATORS.

C. & C. Electric Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.

GRAPHITE.

Dixon Crucible Co., Joseph, Jersey City, N. J.

GRAPHITE (Lubricating)

Dixon Crucible Co., Joseph, Jersey City, N. J.

GREASE (Lubricating).

Cook's Sons, Adam, New York, N. Y.

HAMMERS (Steam).

Chase Machine Co., Cleveland, O.

HARDWARE (Marine).

Baker & Co., Howard H., Buffalo, N. Y.

HEATERS AND PURIFIERS (Feed-Water).

Griscom-Spencer Co., New York, N. Y.
Ross Valve Mfg. Co., Troy, N. Y.

HOISTS (Air).

Great Lakes Engineering Works, Detroit, Mich.

HOISTS (Cargo, Etc.).

American Ship Building Co., Cleveland, O.
Brown Hoisting Machinery Co., Cleveland, O.
Chase Machine Co., Cleveland, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
General Electric Co., New York, N. Y.
Hyde Windlass Co., Bath, Me.
Marine Iron Co., Bay City, Mich.

HOISTS (Chain).

Boston & Lockport Block Co., Boston, Mass.

HOISTS (Electric).

Brown Hoisting Machinery Co., Cleveland, O.
C. & C. Electric Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.

HOISTS (Pneumatic).

Brown Hoisting Machinery Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.

INJECTORS.

American Injector Co., Detroit, Mich.
Jenkins Bros., New York, N. Y.
Penberthy Injector Co., Detroit, Mich.

Buyers' Directory of the Marine Trade---*Continued*

INSTRUMENTS (Nautical).

Ritchie & Sons, E. S., Brookline, Mass.

INSURANCE (Marine).

Belcher, Fred P., Winnipeg, Man.
Elphicke & Co., C. W., Chicago, Ill.
Gilchrist & Co., C. P., Cleveland, O.
Hawgood & Co., W. A., Cleveland, O.
Helm & Co., D. T., Duluth, Minn.
Hutchinson & Co., Cleveland, O.
Lake Transportation Co., The, Cleveland, O.
McCarthy, T. R., Montreal, Can.
McCurdy, Geo. L., Chicago, Ill.
Mehl, Edward, Erie, Pa.
Mitchell & Co., Cleveland, O.
O'Connor, J. J., Port Arthur, Ont.
Parker Bros. Co., Ltd., Detroit, Mich.
Richardson, W. C., Cleveland, O.
Sullivan & Co., D., Chicago, Ill.
Vance & Joys Co., Milwaukee, Wis.
Wilcox, Peck & Hughes,
New York, N. Y., and Chicago, Ill.

IRON (Pig).

Hanna & Co., M. A., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.

JACKETS (Cork).

Armstrong Cork Co., Pittsburg, Pa.
National Cork Co., Brooklyn, N. Y.

LAMPS AND LANTERNS (Ship).

Great Lakes Supply Co.,
Buffalo, N. Y., and Duluth, Minn.
Upson-Walton Co., Cleveland, O.

LAMPS (Arc).

General Electric Co., Schenectady, N. Y.

LAUNCHES. (Steam, Naphtha and Electric.)

Truscott Boat Mfg. Co., St. Joseph, Mich.

LIGHTS (Electric).

Cory & Son, Chas., New York, N. Y.

LIGHTS (Search).

C. & C. Electric Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.

LIGHTS (Water).

Coston Signal Co., Inc., New York, N. Y.

LOGS.

Nicholson Ship Log Co., Cleveland, O.
Walker & Sons, Thomas, Birmingham, Eng.

LUBRICATORS.

Cook's Sons, Adam, New York, N. Y.
Michigan Lubricator Co., Detroit, Mich.
Penberthy Injector Co., Detroit, Mich.

LUBRICATING DEVICES.

Nugent, Wm. W., & Co., Chicago, Ill.

LUMBER.

Martin-Barriss Co., Cleveland, O.

MACHINERY. (Coal and Ore Handling.)

Brown Hoisting Machinery Co., Cleveland, O.

MACHINERY (Dredging).

Chase Machine Co., Cleveland, O.
Quintard Iron Works Co., New York, N. Y.
Superior Iron Works, Superior, Wis.

MACHINERY (Ice).

Great Lakes Engineering Works, Detroit, Mich.
Roelker, H. B., New York, N. Y.

MACHINERY (Marine Steam).

Chase Machine Co., Cleveland, O.
Gillett & Eaton, Lake City, Minn.

MACHINERY (Paddle-Wheel Boat).

Gillett & Eaton, Lake City, Minn.

MACHINERY (Wood Working).

Atlantic Works, Inc., Philadelphia, Pa.
Crescent Machine Co., Leetonia, O.

MACHINES (Towing).

American Ship Windlass Co., Providence, R. I.
Chase Machine Co., Cleveland, O.

MACHINISTS.

Chase Machine Co., Cleveland, O.
Griscom-Spencer Co., New York, N. Y.
Superior Iron Works, Superior, Wis.

MALLETS.

New York Mallet & Handle Works,
New York, N. Y.

MANGANESE BRONZE.

American Manganese Bronze Co.,
New York City.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W., New York, N. Y.

METAL (Anti-Friction).

Cramp, Wm., & Sons, Philadelphia, Pa.

MODELS (Marine).

Boucher Co., H. E., The, New York, N. Y.

MOTORS AND GENERATORS (Electric).

C. & C. Electric Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.

MOTORS (Winch).

C. & C. Electric Co., New York, N. Y.

OAKUM.

Davey, W. O., & Sons, Jersey City, N. J.
Stratford Oakum Co., Jersey City, N. J.

OILING DEVICES.

Nugent, Wm. W., & Co., Chicago, Ill.

OILS AND LUBRICANTS.

Cook's Sons, Adam, New York, N. Y.
Dixon Crucible Co., Joseph, Jersey City, N. J.

ORE (Iron).

Hanna & Co., M. A., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.

PACKING.

Jenkins Bros., New York, N. Y.
Katzenstein, L., & Co., New York, N. Y.

PACKING (Metallic).

Katzenstein, L., & Co., New York, N. Y.

PADDLEWHEEL RIVER BOAT MACHINERY.

Gillett & Eaton, Lake City, Minn.

PAINTS AND VARNISHES.

Baker, Howard H., & Co., Buffalo, N. Y.
Upson-Walton Co., Cleveland, O.

PATENTS.

Siggers & Siggers, Washington, D. C.

PLANTS (Electric Light and Power).

C. & C. Electric Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.

PLATES AND SHAPES (Ship and Boiler).

Otis Steel Co., Cleveland, O.

PLATES (Ship, Structural, Etc).

Otis Steel Co., Cleveland, O.

PRESERVERS. (Life, Life Boats, Buoy, Etc.)

Armstrong Cork Co., Pittsburg, Pa.
Drein, Thos., & Son, Wilmington, Del.
Kahnweiler's, David, Sons, New York, N. Y.
National Cork Co., Brooklyn, N. Y.

PROJECTORS (Electric).

C. & C. Electric Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.

PUMPS AND APPLIANCES (Air).

Fore River Ship Building Co., Quincy, Mass.
Great Lakes Engineering Works, Detroit, Mich.

PUMPS (Hydraulic).

Watson-Stillman Co., New York, N. Y.

PUMPS (Steam).

Donnelly Salvage & Wrecking Co., Ltd.,
Kingston, Ont.

PUMPS (For Various Purposes).

Great Lakes Engineering Works, Detroit, Mich.
Kingsford Fdry. & Mch. Co., Oswego, N. Y.
Michigan Lubricator Co., Detroit, Mich.
Roelker, H. B., New York, N. Y.

REPAIRS (Marine).

American Ship Building Co., Cleveland, O.
Buffalo Dry Dock Co., Buffalo, N. Y.
Chicago Ship Building Co., So. Chicago, Ill.
Collingwood Ship Building Co.,
Collingwood, Ont.
Detroit Ship Building Co., Detroit, Mich.
Empire Ship Building Co., Buffalo, N. Y.
Goldschmidt Thermit Co., New York, N. Y.
Griscom-Spencer Co., New York, N. Y.
Johnston Bros., Ferrysburg, Mich.
Manitowoc Dry Dock Co., Manitowoc, Wis.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Superior Ship Building Co., W. Superior, Wis.
Tietjen & Lang Dry Dock Co., Hoboken, N. J.
Toledo Ship Building Co., Toledo, O.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register Co., Cleveland, O.

REGULATORS (Pressure).

Ross Valve Mfg. Co., Troy, N. Y.

RINGS (Cork).

Armstrong Cork Co., Pittsburg, Pa.
National Cork Co., Brooklyn, N. Y.

RIVETS (Steel for Ships and Boilers).

Great Lakes Engineering Works, Detroit, Mich.

RODS (Manganese Bronze).

American Manganese Bronze Co.,
New York City.

ROPE.

Columbian Rope Co., Auburn, N. Y.
Great Lakes Supply Co.,
Buffalo, N. Y., and Duluth, Minn.

Buyers' Directory of the Marine Trade---*Continued.*

ROPE AND FITTINGS (Wire).

Baker & Co., Howard H., Buffalo, N. Y.
Durable Wire Rope Co., Boston, Mass.
Great Lakes Supply Co., Buffalo, N. Y., and Duluth, Minn.
Upson-Walton Co., Cleveland, O.

SAIL MAKERS.

Baker & Co., Howard H., Buffalo, N. Y.
Upson-Walton Co., Cleveland, O.

SEPARATORS.

Rogers Oil Separator Co., Buffalo, N. Y.

SHAPES AND PLATES. (Ship and Boiler.)

Otis Steel Co., Cleveland, O.

SHEETS (Manganese Bronze).

American Manganese Bronze Co., New York, N. Y.

SHIPS (Builders).

American Ship Building Co., Cleveland, O.
Atlantic Works, East Boston, Mass.
Buffalo Dry Dock Co., Buffalo, N. Y.
Collingwood Ship Building Co., Collingwood, Ont.
Cramp, Wm., & Sons, Philadelphia, Pa.
Chicago Ship Building Co., Chicago, Ill.
Detroit Ship Building Co., Detroit, Mich.
Empire Ship Building Co., Buffalo, N. Y.
Fore River Ship Building Co., Quincy, Mass.
Great Lakes Engineering Works, Detroit, Mich.
Manitowoc Dry Dock Co., Manitowoc, Wis.
Maryland Steel Co., Sparrow's Point, Md.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Newport News Ship Building Co., Newport News, Va.
New York Ship Building Co., Camden, N. J.
Toledo Ship Building Co., Toledo, O.

SPECIALTIES (Steam).

Jenkins Bros., New York, N. Y.
Penberthy Injector Co., Detroit, Mich.
Nacey & Hynd, Cleveland, O.
Ross Valve Co., Troy, N. Y.

SPECIALTIES AND SUPPLIES (Engineering).

Great Lakes Supply Co., Buffalo, N. Y., and Duluth, Minn.
Knudson-Von Kothen Mfg. Co., Dolton, Cook Co., Ill.
Jenkins Bros., New York, N. Y.
Michigan Lubricator Co., Detroit, Mich.
Ross Valve Co., Troy, N. Y.

STAYBOLTS (Boiler—Iron or Steel, Hollow or Solid).

Falls Hollow Staybolt Co., Cuyahoga Falls, O.

STEAMSHIP LINES. (Passenger and Freight.)

American Line, New York, N. Y.
International Mercantile Marine Co., Philadelphia, Pa.
Red Star Line, New York, N. Y.

STOKERS.

Underfeed Stoker Co. of America, Chicago, Ill.

SUPPLIES (Fire Department).

Morse & Son, Inc., Andrew, Boston, Mass.

SURVEYORS (Marine).

Curr, Robert, Cleveland, O.
Parker Bros. Co., Ltd., Detroit, Mich.
Nacey & Hynd, Cleveland, O.
Wood, W. J., Chicago, Ill.

SWITCHBOARDS.

C. & C. Electric Co., New York, N. Y.

TANKS.

Atlantic Works, The, East Boston, Mass.

TESTS OF MATERIALS.

Hunt, Robert W., & Co., Chicago, Ill.

THERMIT.

Goldschmidt Thermit Co., New York, N. Y.

TIMBER (Ship).

Martin-Bariss Co., Cleveland, O.

TOOLS (Hydraulic).

Watson-Stillman Co., The, New York, N. Y.

TOOLS (Metal Working for Ship and Engine Works).

Watson-Stillman Co., New York, N. Y.

TOOLS (Wood Working Machine).

Atlantic Works, Inc., Philadelphia, Pa.
Crescent Machine Co., Leetonia, O.

TOOLS (Wood Working).

Atlantic Works, Inc., Philadelphia, Pa.
Crescent Machine Co., Leetonia, O.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co., Kingston, Ont.
Great Lakes Towing Co., Cleveland, O.

TRUCKS.

Boston & Lockport Block Co., Boston, Mass.

TUBING (Seamless).

Shelby Steel Tube Co., Pittsburg, Pa.

TUGS.

Donnelly Salvage & Wrecking Co., Ltd., Kingston, Ont.

VALVES.

American Balance Valve Co., Jersey Shore, Pa.
Ashton Valve Co., Boston, Mass.
Jenkins Bros., New York, N. Y.
Nacey & Hynd, Cleveland, O.
Penberthy Injector Co., New York, N. Y.
Ross Valve Co., Troy, N. Y.

VALVES (Steam Engine Main).

American Balance Valve Co., Jersey Shore, Pa.

VALVES (For Water and Gas).

Ashton Valve Co., Boston, Mass.
Ross Valve Mfg. Co., Troy, N. Y.

VESSELS FOR SALE (Steam).

Holmes, Samuel, New York, N. Y.
McCarthy, T. R., Montreal, Can.

WELDING (Flue).

Fix's, S., Sons, Cleveland, O.

WELDING PROCESSES.

Goldschmidt Thermit Co., New York, N. Y.

WHEELS (Propeller).

American Manganese Bronze Co., New York, N. Y.
American Ship Building Co., Cleveland, O.
Atlantic Works, East Boston, Mass.
Cramp, Wm., & Sons, Philadelphia.
Detroit Ship Building Co., Detroit, Mich.
Fore River Ship Building Co., Quincy, Mass.
Great Lakes Engineering Works, Detroit, Mich.
Hyde Windlass Co., Bath, Me.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Newport News Ship Building Co., Newport News, Va.
Roelker, H. B., New York, N. Y.
Sheriffs Mfg. Co., Milwaukee, Wis.
Superior Ship Building Co., Superior, Wis.
Thornycroft & Co., Ltd., John I., Southampton, England.
Toledo Ship Building Co., Toledo, O.
Trout, H. G., Buffalo, N. Y.

WINDLASSES.

American Ship Windlass Co., Providence, R. I.
American Ship Building Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINCHES.

American Ship Windlass Co., Providence, R. I.
Chase Machine Co., Cleveland, O.
Hyde Windlass Co., Bath, Me.

WINCHES (Steam).

Chase Machine Co., Cleveland, O.

WOODS. (Cabin and Cabinet Finishing.)

Martin-Bariss Co., Cleveland, O.

WORK (Submarine).

Dunbar & Sullivan Dredging Co., Buffalo, N. Y.
Great Lakes Dredge & Dock Co., Chicago, Ill.
Starke, G. H., Dredge & Dock Co., Milwaukee, Wis.
Sullivan, M., Buffalo, N. Y.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co., Kingston, Ont.
Great Lakes Towing Co., Cleveland, O.
Parker Bros. Co., Ltd., Detroit, Mich.

YACHTS (Builders).

Atlantic Works, East Boston, Mass.
Drein, Thos., & Son, Wilmington, Del.
Truscott Mfg. Co., St. Joseph, Mich.

YAWLS.

Drein, Thos., & Son, Wilmington, Del.

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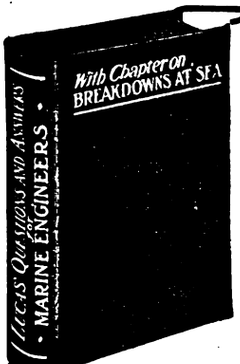

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